

MATHEMATICS PROJECTS  
HANDBOOK  
2017-18

MATH3001 Project in Mathematics

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# 1 Introduction

This handbook is intended for use by students and staff involved in mathematics level 3 projects. Hopefully, it should contain all the information that they need regarding the relevant modules. If this is not the case, or if you find any typos, inaccuracies or contradictions, then please contact Dr Chalykh (o.chalykh@leeds.ac.uk).

Level 3 Projects are opportunities for a student to study a topic in mathematics and develop their research skills, including writing reports and giving presentations. They are open to all students registered for a Mathematics degree (this includes Joint Honours degrees, but please check your programme requirements). MMath students are required to take a project in their final year. This does not stop them taking a project module in their third year. However, students may not take MATH3001 in Year 4.

The projects will be supervised in groups of 4 to 6 students, with one supervisor and one assessor attached to each group. The projects will run over both semesters. Supervisor will meet with students as a group, to set tasks and discuss various aspects of the work. Occasional individual meetings may be arranged at the discretion of supervisor. Total contact hours for the whole duration of the project will be about 10 hours, including interim and final presentations. Some unsupervised student meetings may also be arranged. Assessment will be based on the report submitted at the end of week 8 of Semester 2, **Friday 16 March 2018**, and an oral presentation, including questioning. Oral presentations will take place at the end of Semester 2, in week 12, on **8-9 May 2018**. The amount of work required for project modules depends on the number of credits. MATH3001 is a twenty-credit module, and the standard University rules imply that such a module involves 200 hours of student work.

These notes are intended as guidance, and should be read in conjunction with the relevant module description in the University Catalogue  
<http://webprod1.leeds.ac.uk/catalogue/modulesearch.asp?T=S&L=UG>.

One aim of project work is that students should enjoy an opportunity to study independently and hence should be allowed a certain amount of leeway how they do the project. This is best done by agreement between students and supervisors and so although these notes contain certain rules (e.g., supervisors should meet students in Weeks 2-3 of Semester 1 and provide a written outline of the project), it is important that both parties feel able to negotiate between themselves an appropriate course of action in most instances. A key aim is that students should be given the opportunity to show their strengths.

Students should realise that this project module is **very different** from any previous module taken by them as it will require their independent work on open-ended questions, where there might be no definitive answer or solution.

## 2 Allocation of projects

The process of allocating the projects begins informally before the academic year begins, with the list of the offered projects published to students as early as June of the Year 2. In Week 1 of the academic year, students will be asked to list 10 projects in their order of preference. Final allocation is done by the Module Coordinator based on students' choices and demand. Where a team of supervisors is involved, it is possible to run two groups working in parallel on the same project.

It is the responsibility of the module coordinator to ensure that each student has been allocated a project by the end of Week 2 of the academic year. The ideal situation is one in which all projects are allocated by the end of Week 2. Students should be aware that it is very difficult to change supervisors once the module has started and this will be done in **exceptional cases** only, and only if the circumstances allow that. No changes of project are allowed after Week 4.

An appropriate assessor should be agreed by end of Week 5 of the academic year.

## 3 Supervision

At the start of semester 1, there will be three lectures for all students enrolled on the project. The first lecture will give an overview of the module and the assessment process. The other two lectures will be on general research skills such as finding and evaluating information, report writing, and referencing.

In Weeks 2-3 of the academic year, the supervisor will meet with their group and provide the students with an outline of the topic, together with some some initial tasks and appropriate reading such as textbooks and/or articles. In subsequent meetings the progress will be discussed and additional tasks set. Students may also have their own suggestions and choose to study particular aspects of the topic in greater detail.

Staff supervision will be limited to 8–10 contact hours over the project for the entire group, allowing group supervision meeting approximately every two weeks, each lasting for 1 hour. Some unsupervised group meetings could also be planned, focusing on some particular aspect of the project – for example, students could be directed to read and discuss a particular section of a book or paper, or be asked to discuss or practice group presentation. Some supervisory group meetings can be replaced by individual meetings so that, e.g., a one-hour group meeting is replaced by 10-15 minute long meetings with each student. The choice of supervision arrangements will be up to the supervisor.

Attending supervisory meetings by the students is **compulsory**; as the past practice shows, there is a clear correlation between attendance and the achieved grade for the module.

Supervisors are required to keep a log of each meeting by making brief notes about the attendance and the discussions that took place.

## 4 Advice to students on tackling the project

You are expected to draw up detailed notes on the topic, profusely illustrated with examples. This should be aimed at a reader with a good mathematical background, who however may not be familiar with the particular topic of your research. Therefore, start with an introduction giving an overview of the topic and an outline of your work. **The length of the project report should be between 20-25 pages** (including the contents page and bibliography but excluding the title page and appendices). The final format of the report will depend on the subject area and topic chosen. One common format is that the completed set of notes should be, as near as possible, the sort of notes and examples a student would be expected to collect during a lecture course. This can involve paraphrasing material from a textbook, and solving problems in textbooks to which the answers are not provided. However, there are other formats. For example, a project may involve analysing data and/or writing computer code. Supervisor can give additional, project-specific advice to students in regards to what is expected of their project report. For typesetting, LaTeX is recommended but other formats such as Word are also allowed.

Students are ultimately responsible for their projects; supervisors give guidance and advice. The final report should be in your own words rather than a regurgitation of someone else's work. All work must be submitted with a statement of academic integrity. Furthermore, any submitted work will be uploaded to a plagiarism detection system.

### How to write a good project

- (i). Lots of advice on writing mathematics can be found in Chapters 3 and 4 of Kevin Houston's book, *How to Think Like a Mathematician*. For example, write in sentences, explain notation, and when you give a definition, give an example (or two).
- (ii). Give answers to challenging questions. Markers are more likely to be impressed by your solution to harder exercises.
- (iii). Give your own examples after definitions.
- (iv). Generalize results.
- (v). Deviate from the standard text. Do not just follow the definition, theorem, proof sequence given in a particular textbook, but work out what is important about what you want to say.
- (vi). Collect from a variety of sources. What is the point of just rewriting every sentence from the standard text book?
- (vii). Use consistent notation. Different books use different notation. If you replace the notation in the correct places, then you demonstrate understanding.

- (viii). Tell us what you have added: Eg., ‘In [6] Smith sketches a proof that every grundle is rationally elliptic, here I shall give the details.’ Another example is ‘Jones’ proof in [12] is incomplete as she asks the reader at two points why a statement is true. I have provided the answers.’
- (ix). If you have to take something verbatim from a source, then quote the source and demonstrate that you understand it by giving a pertinent discussion or a good example.
- (x). Make sure the account is clear (e.g., words in theorems are defined) and logical (e.g., the definitions come *before* the theorem).
- (xi). When analyzing data in Statistics, take care to describe exactly what statistical methods are being used and how they enhance the understanding and interpretation of the data.
- (xii). Use appendices, for example for original source code of numerical work.

A key point is that you should *demonstrate* that you understand what you have written. You do not want the marker to think that everything has just been copied without any thought. Markers are more likely to reward independence and students being proactive (but that should not stop you from asking for help and advice).

## 5 The interim presentation and interim report

There will be an interim assessment at the end of semester 1 (weeks 10-11), run and organised by the supervisor. This assessment takes the form of a one-hour group meeting (with supervisor and, possibly, assessor), at which each student gives a 5–10 minute presentation followed by gentle questioning. In addition, students will submit written reports describing their research. Students will thus gain experience of giving presentations and will receive feedback on a piece of their written work.

The preferred model for the interim presentation is a group presentation where the students aim at giving a coherent review of the work done in semester 1. This way they gain experience of working as a team - something they will also need to demonstrate at their final group presentations in semester 2. In addition to describing their work, the interim presentation may include additional tasks set by supervisors (for example, a literature review).

At the time of the interim presentation, the students also need to submit a written report of about 4-5 pages, describing their research so far. The report should be written in a style similar to that of the final report. It is recommended that supervisors ask students to produce one-two pages of written notes for each supervisory meeting in semester 1. The interim report then could be a compilation of those notes. Feedback on the interim reports should be provided by the

supervisor in semester 2. This should be done in good time, normally in the first supervisory meeting of the semester.

The interim presentaion and report will be a pass/fail assessment. Students who fail the assessment (i.e., do not turn up to the session, or do not submit a report, or fail to make a serious attempt) will have 10% deducted from their final module mark.

## 6 Submission of project

The final report should be submitted in **two hard copies** to the supervisor and **electronically via the module VLE page** by **5pm, Friday 16 March 2018**. The hard copies must be bound or stapled. The electronic versions should be in Word, pdf or some other common format. (Electronically scanned copies of a wholly handwritten report are not permitted.) Students must keep a copy of the report for their own records.

The submission must be accompanied by an academic integrity form (the form can be found on the module area on the Blackboard VLE) and will be checked for plagiarism using the standard University software. If any plagiarism is suspected, the standard University procedures on plagiarism will be followed. Information on what consitutes plagiarism can be found in the University Taught Student Guide.

In accordance with University rules, late submission results in a deduction of 5 marks (out of 100) per calendar day. If a student is unable to submit the work, for whatever reason, then they should contact their supervisor or module coordinator as soon as possible. Reports which are submitted later than two weeks after the due date will not be read and assessed, except for the cases when an extension has been granted. Students are reminded that information on special circumstances can be found on the School of Mathematics website.

The final project report should include a summary (typically, in the introductory section) describing the scope of the work and the main results, indicating the main sources used.

Pages and sections should be numbered for easy reference and the title page should contain student name, student number, module code and title, title of project, supervisor and the date of submission.

The report should include a contents page and a full bibliography, indicating all the books, articles or websites used. **The length of the project report should be between 20-25 pages** (including the contents page and bibliography but excluding the title page and appendices).

Recall that, in the text, if a lemma or theorem is taken from some source, there must be an indication of the source, and whether it has been significantly expanded or adapted. Apart from short statements, students should not copy directly from sources, and everything must be expressed in the student's own words, except where explicitly stated. Students whose work is too closely based on their sources will have marks deducted.

## Summary

- (i). Title page: Name, number, module, title, supervisor, date.
- (ii). Academic integrity form.
- (iii). Contents page.
- (iv). Introduction, outlining the topic and giving summary of work.
- (v). Numbered pages (and sections).
- (vi). Bibliography of sources used.
- (vii). Upload to VLE.

## Duties of supervisor and assessor after submission

After submission of the report, the supervisor will pass a copy of the report to the assessor. The supervisor should keep the other copy of the report.

The project will be marked by the assessor and the supervisor independently; the relevant sections of the assessment form should contain preliminary marks given by them based on the report **before** the oral presentation and questioning. The final marks for each student should be agreed between the supervisor and the assessor after the oral presentation and questioning have taken place.

The supervisor is responsible for returning one copy of each final report to the module coordinator (annotated copies are particularly welcome).

## 7 Oral Presentation

Each group of students will be required to give a presentation in Week 12 of Semester 2, **8-9 May 2018**, counting for 10% of the module mark. It should last about 15 minutes, and involve a contribution from each group member towards a coherent group presentation. Therefore, some teamwork is required here. A presentation mark will be awarded, with 50% based on the group performance, and 50% based on the individual contribution. Module coordinator will inform students in good time of the date and place of the presentations.

The group presentations will be organised into sessions, with several groups present and which will be open for other students and staff to attend. Thus the focus of the presentations will be on communicating the findings of the project to fellow students, and it should be aimed at them as the audience. Questions will be encouraged, particularly from other students.

During the group presentation, students will be asked to assess individual presentations and contribution by their group peers. The results of peer assessment should be collected by the supervisor and taken into account when finalising the module marks.

There are two main aims to the presentation:

- (i). Students should demonstrate that they understand and have mastered the material.
- (ii). Students should demonstrate their presentation skills.
- (iii). Individual contributions for students should combine in a coherent group presentation.

Students can make the presentation in any format they like, eg OHP slides, PowerPoint, black/white board, video, flip-chart, etc.

Students should inform the module coordinator at least one week ahead of time of their requirements for the presentation. It cannot be assumed that the room for the presentation will contain a computer with every possible computer program. *Students are advised to bring electronic files on a memory stick as occasionally wi-fi connections etc do not work.*

In addition to the group presentation, each student will have an individual 10–15 minute feedback and questioning meeting with the supervisor and assessor, where verbal feedback on the report should be provided and some questioning will take place. This interview will strongly inform the mark for understanding for the project report. The interviews should be organised by the supervisor; normally they take place during weeks 10-11 of semester 2.

After all projects have been assessed, the module coordinators can moderate marks taking into consideration fairness and consistency. The module coordinator is responsible for the final module marks.

### **Advice to students on presentations**

- The presentation will pass by quicker than you think so plan carefully.
- Cover some part of the material in depth rather than all parts superficially.
- A good example is worth a thousand words.
- Latex reports can be quickly turned into a ‘Powerpoint’ type presentation by using the Latex package Beamer. (Google ‘Latex beamer’.)
- Practise in front of friends and family, even those that have no understanding of mathematics. This will give you confidence and you will be less nervous. It also allows you to judge the timing.
- Imagine that the presentation is for a job interview or a pitch to a client.
- Does it look professional?

## 8 Post-Assessment and feedback

The supervisors are ultimately responsible for filling out the assessment and feedback forms and returning them to the module coordinator.

The feedback comments from the assessment and feedback form (without the marks) should be sent by the supervisor to each student after the presentation and questioning within a good time.

Assessors and supervisors should be aware that the assessment documentation written by them may be made available to the student and the external examiner.

The module coordinator is responsible for ensuring that all marks are collected, moderated, and submitted to the Mathematics Taught Student Office by the relevant University deadlines. They are responsible for collecting the assessment and feedback forms from the supervisors and ensuring that they are ready for the external examiners.

## 9 Responsibilities

### Module Coordinator

- (i). Ensure that websites and VLE sites have material relevant to the new academic year before it begins. To include:
  - (a) This handbook.
  - (b) Academic integrity forms.
  - (c) Assessment pro-forma.
- (ii). Matching of supervisors and students by end of Week 2 of academic year.
- (iii). Assign assessors by end of Week 5.
- (iv). Check for problems in Week 4 by emailing students and supervisors.
- (v). To send email reminders to students and supervisors regarding deadlines.
- (vi). Organize final presentations.
- (vii). Ask students for their presentation requirements.
- (viii). Ensure fairness and consistency in the assessment process. Moderate marks if necessary.
- (ix). Prepare marks and projects for external examiner.

## **Supervisor**

- (i). To meet with students in Week 2-3 of semester 1 to provide project outline and set initial tasks.
- (ii). Organise regular supervisory meetings for discussing progress and setting additional tasks. Provide advice and support within the limits of the allocated time.
- (iii). To report any concerns regarding student work (such as absences or low participation) to module coordinator in good time.
- (iv). Organise interim presentations in Week 10-11 of semester 2.
- (v). To provide feedback to students on the quality of their interim report in good time (normally, in the first supervisory meeting in Semester 2).
- (vi). To pass a copy of the final report to the assessor.
- (vii). To read the final reports in good time.
- (viii). Complete the the relevant sections of the assessment form *before* the presentation. Finalize it after presentation and questioning.
- (ix). Organize individual questioning session.
- (x). Send written feedback to student after presentation and questioning within a good time.
- (xi). Return copies of the reports and completed assessment and feedback forms within a good time.

## **Assessor**

- (i). To read the final reports in good time.
- (ii). Complete the the relevant sections of the assessment form *before* the presentation.
- (iii). Attend group presentation and individual questioning session.

## **Student**

- (i). Attend supervision meetings.
- (ii). To be aware of deadlines.
- (iii). Submit work by deadlines.
- (iv). Not plagiarize.

- (v). Ensure to be registered for the module in good time. Read and reply to e-mails.
- (vi). Communicate their needs for presentation (such as Powerpoint, blackboard) to module coordinator at least one week before the presentation.

## 10 Timeline

Time	Action
Pre academic year	Module coordinator updates VLE and websites Updating list of projects
Semester 1	
Week 1	Introductory Lecture Students submit thier project choices
Weeks 1-2	Allocation of projects
Weeks 2-3	First meeting with supervisor Lectures on research skills and report writing
Week 4	Module coordinator contacts students and supervisor to check progress/issues
Week 5	Allocation of assessors
Weeks 10-11	Interim presentations
Semester 2	
Weeks 1-2	Feedback on written work (interim reports)
Week 8	Final reports
Weeks 10-11	Questioning session
Week 12	Oral presentations <b>8-9 May 2018</b>
May/June	Feedback returned to students

# 11 Assessment Guidelines

The following is meant as a guidance to what constitutes a particular mark. Comments on the assessment pro-forma should refer to some of these criteria.

## Class I, 70-100

- Extremely well organized and presented.
- Project could serve as a basis for a mini-course at the appropriate level.
- Excellent choice of examples and logical flow.
- Good evidence of originality and independent thinking.
- Mastery of material.

To achieve a Class I students do not need to have achieved mastery or excellence in all the above. Greater marks will be given for originality and evidence of independent thinking.

## Class Iii, 61-69

- Well organized and presented.
- Good choice of examples and logical flow.
- Some evidence of independent thinking. Follows standard texts sometimes.
- Sound understanding of material.

## Class Iiii, 50-59

- Adequately organized and presented.
- Reasonable choice of examples and logical flow.
- Required a substantial amount of help from supervisor (relative to difficulty of topic).
- Little evidence of independent thinking. Tends to follow sources.
- Some good understanding of material.

### **Class III, 40-49**

- Poorly organized and presented.
- Poor choice of examples and logical flow.
- Required a significant amount of help from supervisor (relative to difficulty of topic).
- No evidence of independent thinking. Slavishly follows sources.
- Some understanding of material.

### **Fail, 0-39**

- Almost non-existent organization and presentation, for example sections missing.
- No new examples. Illogical arguments.
- Required a substantial amount of help from supervisor (relative to difficulty of topic) or did not see supervisor.
- No significant understanding of material demonstrated.

## **12 Resits**

Students who failed the module will have two resit opportunities: one in August of the same year and another in May/June next year. Resitting candidates will be required to re-submit their report by an official deadline and attend a questioning interview with the supervisor and the assessor or a designated member of staff. If necessary, the interview can be conducted over Skype. Presentation will not be required as the mark for the presentation will be carried forward. No supervision will be provided to resitting candidates.