

# MA4504 Mathematics Project

## Study Guide 2006/2007

Department of Mathematics  
University of Leicester

1. **Introduction** The 40 credit Mathematics Project is compulsory for students on the M.Math. degree in Mathematics. The work on the project occupies both semester and culminates in the submission of a thesis. This study guide explains the administrative arrangements for the 40 credit project, including deadlines for required work, and provides guidelines for the content and presentation of the thesis and other documents which students are required to produce.

**Note: the 40 credit M.Math. Project cannot be taken in conjunction with the 20 credit M.Math. Project MA4501.**

2. **Aims and Objectives** The purpose of the Mathematics Project is for the student to combine the skills acquired in other modules in the production of a suitable project. In doing this, the student will assimilate information from a variety of sources and demonstrate the ability to pursue an extended period of independent study of some depth.

During the first semester, the student will establish the lines of enquiry to be followed and produce a preliminary report, demonstrating both progress to date and a detailed plan of the further steps needed to complete the work.

During the second semester, the student will complete the project work planned and submit a substantial Mathematics dissertation.

A typical project might involve, for example:

- a survey/critique of an existing area, not covered in existing courses, culminating in an overview and explanation of appropriate research literature and/or advanced texts;
- an initial course of reading leading to a small research project;
- the development of a piece of mathematical software.

As part of these modules the student will: pursue a course of self-study with guidance from a member of staff; receive instruction on appropriate use of library facilities; write an interim report and a structured thesis (the 'project dissertation') on an advanced mathematics topic in  $\text{\LaTeX}$  (a technical word processing package); receive instruction on making formal oral presentations, and give two oral and visual presentations to a group of peers and staff.

The ability to learn independently and the ability to solve mathematical problems are two of the department's objectives for its students. These modules aim to develop both of these to an extent which is not possible in a 20 credit project. The opportunity to make a real contribution to knowledge through a small research project certainly requires the ultimate in problem-solving skills. Similarly, successfully completing one third of one's final year curriculum without the guidance of lectures or similar classes should be greater evidence of the ability to study independently than any other activity undertaken by an undergraduate.

3. **Allocation of Supervisor and Topic** Formal allocation of supervisors to students takes place at the beginning of the first semester. Usually, students are allocated to supervisors on the basis of the preferences expressed by students. However, in order to equalise the load amongst staff, you may not get the topic of your first choice. It is the student's responsibility to find a supervisor and suitable project.
4. **Role of Supervisor** The supervisor will meet with the student once a week to discuss the progress of the project. The primary function of the supervisor is to *advise* the student on the content of the thesis, the methods to be used in developing the work, the presentation, and the final thesis. It is not the function of the supervisor to give instructions to the student as to how to proceed, still less to do any of the work. The project is required to be entirely the student's own work, and it is their responsibility to ensure its quality.
5. **Marks and deadlines for work**
- (a) The *Student Diary* should be used as a way to organize your work through both semesters. There will be no marks for this part of the project. The diary should document your weekly activities and both student and supervisor must fill in the diary form (a specimen of which is included as an appendix to this document) every week. Both student and supervisor will keep a copy of each week's form.
- (b) For the *overall approach* towards the project, the supervisor will take account of the following questions:
- time management; that is, was the expenditure of effort across both semesters reasonably uniform.
  - planning of weekly work; that is, were the weekly bits and pieces adequate and doable.
  - effectiveness of work; that is, were the spent working hours in relation to the outcome.
  - flexibility, that is, was the student able to deal with unforeseen problems (lack of sources, etc).
- (3 marks)**
- (c) The *Project Description Document* will be handed in by the end of the third week of the first semester. This will be about 500-1000 words in length, and will indicate that the student is clear about the aims and objectives of the project. It will conform to the following recommendations of section 8: 8a, 8b 8c. It will be handed back marked after one further week. Up to 2 marks will be awarded for this Project Description Document. **(2 marks)**
- (d) The *interim report* will be handed in by the end of week 11 of the first semester. This will be about 5000 words in length and will report on progress made to date and any revisions made to the original plans in the Project Description Document. It will include a survey of the background to the project demonstrating a good knowledge of the subject area of the project. The marked report will be returned at the beginning of the second semester. Further information on the content and format of the interim report is contained in sections 7 and 8 below. **(30 marks)**
- (e) The *first presentation* will take place during week 11 of the first semester. This will last for a maximum of 25 minutes. Of these, 20 minutes will be allotted for the actual presentation and 5 minutes for questions. The presentation will be to a group consisting of members of staff together with other students on the project module MA4504. **(10 marks)**
- (f) The *Project Dissertation* will be handed in by the end of the eleventh week of the second semester. It will be about 13,000-15,000 words in length and will conform to the recommendations of sections 7 and 8. **(45 marks)**

- (g) The *second presentation* will take place during week 12 of the second semester. Like the first semester presentation, it will last for a maximum of 25 minutes, with 20 minutes allotted for the actual presentation and 5 minutes for questions. The presentation will be to a group consisting of members of staff together with other students on the project module MA4504. **(10 marks)**

## 6. Presentation Guidelines

The presentations should normally be based on overhead projector transparencies. Remember that if you take three minutes to explain each slide you will only be able to get through seven slides. Clear handwritten slides are acceptable; however should you wish to word process your slides, then see the remarks on L<sup>A</sup>T<sub>E</sub>X in section 7. Realistically the presentations cannot do more than outline the general idea of the project and any points of particular interest.

### Assessment of presentations

The assessment of both presentations will be according to the following scheme:

- (a) the extent to which the presentation indicates the overall subject matter covered within the thesis, use of examples in delivery of talk, and general stimulation of interest. **(3 marks)**
- (b) the student's ability to explain and demonstrate understanding of the specific mathematical ideas discussed within the presentation. **(4 marks)**
- (c) the quality of the presentation, with particular reference to its structure and overall coherence, timing, clarity of board or OHP use, and audibility. **(3 marks)**

To help students prepare for the presentations there will be an opportunity for a one-hour workshop on presentation skills run by the Teaching and Learning Unit shortly before the time of each presentation. (Each student must attend at least one of these workshops.)

## 7. Interim Report and Project Dissertation Guidelines

The formatting and structure of the interim report and project dissertation must conform to all subsections of section 8 (that is, 8a, 8b, 8c, 8d, 8e, 8f, 8g, 8h).

The Department uses L<sup>A</sup>T<sub>E</sub>X extensively for the production of mathematical documents, and this is the technical word processing package which you will use to prepare your dissertation and report. There are standard style files for producing both the project description document and the dissertation. For the interim report the 'dissertation' style file should be used. Soft copies of these files will be emailed to each student. Use of this package, style files, and the sample will allow you to comply pretty painlessly with most of the typesetting requirements of this section. There are also style files which will enable you to produce slides in L<sup>A</sup>T<sub>E</sub>X for your presentations should you wish to do so.

In addition to those items specified in subsection 8c, the title page must contain (as appropriate) the words

“Project Description Document for a Thesis to be submitted at the University of Leicester in partial fulfilment of the requirements for the degree of Master of Mathematics”,

“Interim report submitted at the University of Leicester in partial fulfilment of the requirements for the degree of Master of Mathematics”

or

“Thesis submitted at the University of Leicester in partial fulfilment of the requirements for the degree of Master of Mathematics”.

Students must submit two bound copies of their project dissertation and of their interim report. Spiral binding is the minimum acceptable standard of binding. The department has facilities for carrying out this kind of binding on a do-it-yourself basis — your supervisor will be able to give you advice.

The interim report and project dissertation should normally contain the following components:

- abstract
- an introduction elucidating the problem and the objectives of the project
- the main body of material
- references

See section 8 for further details on the structure of the project dissertation and interim report.

All the above items will be taken into account in the assessment of the interim report and project dissertation, together with the standard of layout and organization of each.

### **Assessment of Interim Report**

The assessment of the interim report will be according to the following scheme:

- Awareness of subject:* The subject material should be in line with the project description and at an appropriate level, taking into account the student's mathematical background in the chosen topic. There should be a suitable introduction to the subject matter including the placing of the material within a wider mathematical context. The student will be expected to demonstrate a good knowledge of the subject area of their project. There should be appropriate and accurate referencing of all source material. **(7 marks)**
- Content and communication:* The interim report should show mathematical depth and maturity though the content and its communication. This includes accuracy of mathematical content and clarity of exposition, and thus the interim report should be well-structured so that the reader may easily identify the key points. Fundamental concepts should be properly introduced. Care should be taken over the precision of language, and the correct and clear use of appropriate mathematical notation. **(10 marks)**
- Understanding:* The student should demonstrate a good understanding of the subject material of the topic studied so far, and have clearly outlined the tasks to be undertaken to complete the project dissertation. The examiners wish to see evidence of insight shown by the student in the subject of the project. **(8 marks)**
- Independence:*  
The examiners are looking for evidence of the development of independence of study throughout the semester in the discussions between the student and their supervisor. This may be shown through the questions asked, the mathematical problems solved, or the way the material is handled. **(5 marks)**

Notice that, compared to the Project Dissertation, there are no marks allocated for originality at this stage, and more allocated for awareness of the subject area and for a clear view of the way ahead.

### **Assessment of Project Dissertation**

The assessment of the project dissertation will be according to the following scheme:

- Content and communication:* The content of the project dissertation will be assessed taking into account the mathematical depth and maturity exhibited in the subject matter, the

progress made since the interim report, and the extent to which there is sufficient coverage of and appropriate balance between the main mathematical ideas. The examiners will look for the degree of originality shown, having regard for the aims of the project. Assessment of the content also includes consideration of the accuracy of the mathematical content, the wider mathematical context in which the student places the material, the clarity and structure of the exposition, the proper introduction of fundamental concepts, the provision of an appropriate bibliography, the use of appropriate mathematical notation, and the precise use of language.

(25 marks)

(b) *Understanding*: The student should demonstrate a good understanding of the subject material of the topic and its wider context. The examiners wish to see evidence of insight shown by the student in the subject of the project and in the cohesive structure of the project dissertation.

(10 marks)

(c) *Independence*: The examiners are looking for evidence of the development of independence of study throughout the semester in the discussions between the student and their supervisor. This may be shown through the questions asked, the mathematical problems solved, or the way the material is handled.

(10 marks)

8. **Format and Structure of Documents** The format and structure of the various document submitted should conform to the following:

(a) All documents must be printed on A4 paper on one side only. Font type and size should be as set up in the style files provided for this module. Program code segments and computer outputs should be in typewriter style.

(b) All documents must have numbered pages. The first page of the main body of text should be numbered with the arabic numeral 1. Preliminary pages such as the table of contents should be numbered using small roman numerals (such as i, ii).

(c) The project description document, the interim report and the project dissertation must start with a title page supplying the following information:

i. The full title of the project

ii. The full name of the author

iii. The month and year of submission

iv. "Department of Mathematics, University of Leicester"

(d) The interim report and project dissertation must contain a table of contents. This should follow immediately after the title page. It must list, in sequence, all relevant subdivisions of the document.

(e) In the interim report and project dissertation the signed declaration shown below must follow the table of contents:

## DECLARATION

All sentences or passages quoted in this project dissertation from other people's work have been specifically acknowledged by clear cross referencing to author, work and page(s). I understand that failure to do this amounts to plagiarism and will be considered grounds for failure in this module and the degree examination as a whole.

Name:

Signed:

Date:

- (f) The interim report and the project dissertation should include an abstract summarizing the contents in about 200 words. The abstract should follow the declaration on plagiarism. The abstract must provide a synopsis of the document and must state clearly the nature and scope of the work undertaken and of the contribution (if any) made to the knowledge of the subject treated.
- (g) The project plan document, the interim report and the project dissertation should contain a list of references. This will occur at the end of the main body of text, and will be arranged either alphabetically by authors or in the order in which the references are first cited in the report. Every reference in the list should enable the reader to identify the work cited and locate the specific passage referred to. Three methods of listing references and giving citations are shown in the table which follows:

Listed reference	Citation in text
[1] Silberschatz, A. and Galvin, P.B., <i>Operating System Concepts</i> , Addison-Wesley, Reading, Massachusetts, 1994	[1]
[Si94] Silberschatz, A. and Galvin, P.B., <i>Operating System Concepts</i> , Addison-Wesley, Reading, Massachusetts, 1994	[Si94]
Silberschatz, A. and Galvin, P.B., <i>Operating System Concepts</i> , Addison-Wesley, Reading, Massachusetts, 1994	Silberschatz and Galvin (1994)

Once again, use of the L<sup>A</sup>T<sub>E</sub>X style file will make the creation of a bibliography quite easy.

- (h) The interim report and project dissertation may contain appendices: for example, data sets or computer programs would normally be relegated to appendices. Any appendices should follow the list of references.

It is important for you to realize that your documents are partly assessed on the standard of presentation, including correct and clear use of the English language. Unless you are exceptionally confident in your ability as a speller and proof reader, you should take advantage of automatic spell checking facilities available on the computer system you are using, and you should strive to ensure that your documents are written in lucid and grammatical English. If you have problems with English language composition, you should ask your supervisor for advice on reading material to give you help in this area. Remember that competence in expressing oneself clearly is a vital skill in professional life!

9. **Late Submission** Please note that every component in the assessment on these modules has associated with it a deadline for submission. We need you to meet these deadlines, since it is in your interest that we keep to the prearranged timetable for the marking and return of work so that you receive constructive feedback on your progress in good time.

As a result of the need to get your work marked, the deadline stated for each piece of work is a **strict deadline**, that is there will be **no extensions** and work handed in late will receive **no marks**. In the event of your being unable to complete in time because of illness or other bona fide reason, allowance can only be made provided that suitable documentation is produced.

The University is now operating a system in which students fill out a self certification form if they are absent from the University due to illness or physical incapacity for a period of less than five working days, where this has resulted in

- absence from teaching sessions at which attendance is compulsory
- a failure to meet submission deadlines
- interrupted study to a significant extent.

It is the responsibility of the student to make all reasonable efforts to hand in coursework to the Department on time, even if absent due to ill health. The Department will accept coursework handed in by other people, and also by mail, as long as the date on the post mark of the submission is the submission date (or earlier). If a student is too ill to get to a post box then we would strongly recommend the student call out a doctor.

The self certification form can be obtained from the Departmental Office, and must be completed and returned to either the Departmental Office or the student's personal tutor within the first three days of return to the University. Self certification forms will not be accepted if returned to the Department after the three day period.

For a period of absence of five days or longer a medical certificate is required.

Medical certificates and self certifications will be taken into account when producing the final mark for a module, and also when final degree classifications are being decided.

In view of the importance of handing in work on time, you need to make a conscious effort to organize your time effectively. You will not be able to meet the deadlines if you spend ten weeks on something else and then try to do all the work in the two weeks.

10. **Plagiarism** While you may certainly ask your supervisor for help if you are having difficulties with your work, and while you may discuss your work with other students in general terms, copying either other students' work or published work constitutes plagiarism and is strictly forbidden. You should reference well any materials that you have used to write your project.

Your attention is drawn to the University regulations on plagiarism and to the Departmental penalties; you may find the details in the Departmental handbook and on the web by following the links at

<http://www.le.ac.uk/academic/quality/Codes/examining/>.

Note also the signed declaration which you must include in your final report (see subsection 8e).

## MA4504 Project Weekly Diary Form

**This section to be filled in by student:**

Week beginning:

Student's Name:

Outline your plan for the week:

To what extent did you achieve the plan:

Time spent:

Any other comments on the week's progress:

**This section to be filled in by supervisor:**

Supervisor's Name:

Comment on student's Diary:

**Copies of this form are to be retained by both student & supervisor**