# MSc Mathematical and Computational Finance
# Dissertation guidelines

April 7, 2025

## Contents



## 1 The dissertation

All students on the MSc in Mathematical and Computational Finance must complete a dissertation. The dissertation component of the MSc has a weighting of 30% in the final overall assessment for the degree.

### 1.1 Choosing a dissertation topic

During Hilary Term, students will be sent a list of possible dissertation projects suggested by potential supervisors. This list may include "external/industry" projects, which will often be based in an external financial institution as part of an internship.

Around this time in Hilary Term, the Course Director will outline to the students the broad process that will be followed during the dissertation projects, and will refer the students to the detailed information on dissertations, as given in this document.

Students doing their dissertations with an industry partner or as part of an industrial internship will have a dissertation supervisor in the external company, the "external supervisor".

An "internal supervisor" from the University will oversee progress, receiving any progress reports from the student and/or the external supervisor. The detailed technical supervision of the project will be carried out by the external supervisor, with the internal supervisor acting in an oversight role.

Students doing a dissertation project in the department will have a (traditional, thus internal) dissertation supervisor in the University. Note that all students are assigned an initial academic supervisor at the beginning of the course. This person will usually not be the dissertation supervisor. When the latter is confirmed they replace the former.

Further details on the roles of supervisors and the expected number of contact hours are given in Section 4 on supervision.

The list of projects sent to students is not exhaustive and students are encouraged to talk about other ideas to any potential supervisors, which includes most academics and research fellows in the Mathematical and Computational Finance group, some academics in the Stochastic Analysis group, and some academics in the Department of Statistics.

For any project suggested by a student, it would be necessary to find a faculty member able to supervise it. Students should be aware that individual supervisors have limited capacity, so students may have to be flexible. Students will indicate their preferences for dissertation projects from the list of potential projects.

The Course Director will assign students to project supervisors. Project and supervisor allocation will be finalised by the end of Hilary Term.

## 2 Submission information

An electronic copy of the dissertation must be submitted to the online Inspera coursework submission system by noon on Friday of Week 10 of Trinity Term.

Submitted electronic dissertations will be screened by Turnitin software which will compare each dissertation to a wide range of material (both published and unpublished) and to the work of other candidates. The examiners will be notified of the extent of any textual matches discovered by Turnitin, and will consider, for instance, whether any text that a candidate has copied from elsewhere is properly identified and the source duly acknowledged.

In the extremely unlikely event that there seems to be a technical problem and the student is concerned that their work has not been submitted, the student should please email their dissertation to mathcompfin@maths.ox.ac.uk immediately, togther with a copy of the Declaration of Authorship to attest that it is their own work, except where indicated. The Declaration of Authorship can be found here: Declaration of Authorship. Note that completion of this declaration of authorship form is only necessary if the dissertation is submitted via email.

Further information on writing dissertations, including the use of LaTeX and referencing, is given in Section 3. This, along with other practical matters associated with the submission, as well as links to some past sample dissertations, can be found at the following website: Mathematical & Computational Finance MSc Exams and Dissertations.

## 3 The format of the dissertation

Dissertations should be no more than 40 pages long, excluding front matter (title page, abstract, acknowledgements, table of contents), appendices and references, but including figures

and tables. Material such as computer code may be included in appendices.

Dissertations which do not adhere to page limits will incur a penalty, as specified in the following table:

| Length of dissertation | Penalty (USMs) |
|---|---|
| 41-42 pages | 1 |
| 43-45 pages | 5 |
| 46-50 pages | 10 |
| 50 pages or more | 20 |

One of the purposes of the page limit is to prevent excessive inclusion of material that is unnecessary for the development of the key argument(s) of the dissertation. Further information may be included in appendices. However, whilst examiners are required to consider the main body of the dissertation, whether they read appendices is entirely at their discretion.

The thesis should contain material which, although not necessarily original research, cannot be found elsewhere. A very wide range of topics and approaches may be suitable for dissertation, including works focusing on theoretical mathematical results, works focusing on modelling aspects and testing the results on limited amount of synthetic data, or works which are data-driven in nature. Credit will be given for the mathematical and financial content, as well as for the quality of the presentation and the clarity of the writing.

The dissertation should be typewritten. LaTeX is **strongly recommended** (but is not compulsory). A 12pt font size is recommended, and in all cases must be no smaller than 11pt.

An MSc Thesis LaTeX template file is available at:

`https://www.maths.ox.ac.uk/system/files/attachments/MScThesisMain.tex`

and the style file for the above template is available at:

`https://www.maths.ox.ac.uk/system/files/attachments/MScThesis.cls`

The line spacing of the text should be at least one and a quarter spacing, which will be achieved automatically by the above template (or, in general, use the command \setlength{\baselineskip}{1.25}).

You may also use the OCIAM thesis class for LaTeX which can be downloaded from:

`https://www.maths.ox.ac.uk/members/it/faqs/latex/thesis-class`

The one and a quarter line spacing of the text can be achieved with the OCIAM thesis class by using a baselinestretch of 1.25.

For pictures and graphics, it can sometimes be awkward at first to get these right. A good LaTeX guide can be helpful in this regard (further information on using LaTeX is given in Section 3.3). Sometimes, in order to make axis labels (and so on) large enough on the final dissertation document, one has to enlarge the picture compared to the original graphic (originating, for instance, from Matlab or Python).

## 3.1 Referencing and plagiarism

The golden rule is that one must always enable the reader to see when an idea or some mathematical material has come from another source. One does this when introducing the material; for example, by saying:

> *In this section we follow [2]*

or

*As shown in [1], the formula for the call option is....*

The first of these is appropriate when paraphrasing a body of work, the latter is more specific.

Where used, direct quotations should be indicated with quotation marks:

*"That's one small step for a man, a giant leap for mankind." [7].*

Note that it is not sufficient merely to list some relevant sources at the end of the work; the document should indicate the work that is being referred to in the body of the text. The MSc MCF handbook contains more advice on avoiding plagiarism, both in the dissertation and in coursework.

It is important that a dissertation is a student's own work and thus all sources should be carefully referenced in order to avoid plagiarism. The University's policy on plagiarism is given at:

`https://www.ox.ac.uk/students/academic/guidance/skills/plagiarism`

### 3.2 Bibliography

The reference list should cite the authors, title, date, journal, volume and page numbers for each reference. The bibliography lists of published papers and books are useful guiding examples. One can also use the cite feature on Google Scholar to produce bibliography items in one of the appropriate styles. The items in a bibliography are typically ordered alphabetically by the name of the first author. Multiple items by the same author(s) are ordered by the date of publication.

Using BibTeX is an excellent way to create a bibliography: see the Mathematical Institute's LaTeX help page (a link is given in Section 3.3), with the specific page on BibTeX located at:

`https://www.maths.ox.ac.uk/members/it/faqs/latex/bibtex`

One can also use MathSciNet to help create accurate reference details: one can visit the AMS Mathematical Reviews website (MathSciNet) at:

`https://mathscinet.ams.org/mathscinet/publications-search`

where one can search for publications, and find a helpful *Cite* tab, that will give the appropriate text to use in a BibTeX database file.

### 3.3 Material on using LaTeX

An excellent online guide to LaTeX is *The Not So Short Introduction to LaTeX2e*, which is available at:

`https://tobi.oetiker.ch/lshort/lshort.pdf`

As well as the LaTeX thesis and class files cited earlier, one can consult the Mathematical Institute's IT help page for LaTeX at:

`https://www.maths.ox.ac.uk/members/it/faqs/latex`

which contains a wealth of material, including links to the OCIAM thesis class template and associated files, as well as alternative links to the The Not So Short Introduction to LaTeX2e.

## 4 Supervision

Once a student starts work on their dissertation project in Trinity Term, they should expect to hold regular meetings with their supervisor.

MSc MCF students take their second set of exams towards the very end of Hilary Term (Week −1 of TT, usually), so can expect to start working on their dissertation around Week 0 to Week 1 of Trinity Term. The submission deadline is at the end of Week 10. Students should expect to meet with their supervisor 4-8 times with approximately 6 hours of total supervision. The frequency of the meetings will be determined by the faculty supervisor depending on the project.

The nature of the supervision will depend on whether the student in working in the University with an internal dissertation supervisor, or externally with an industry partner and associated external supervisor (with an internal university supervisor acting in an oversight role). Below is a typical supervision time-frame in each of those cases:

### 4.1 Internally supervised projects

Students will meet with their supervisor at (or before) the start of Trinity Term, for an initial meeting to discuss the project and the pattern of project supervision. Support given by supervisors may be given in meetings or via email. A typical supervision schedule will then be along the following lines:

- Meetings with the faculty supervisor where the student updates the supervisor and receives ongoing guidance. The overall structure of the dissertation is likely to be established in the first two meetings, with some parts understood to be optional, depending on how the student progresses with the project. After 4 or 6 weeks, the students is expected to hand in a sample of their writing so that the supervisor can offer preliminary comments.

- A draft of the dissertation should be given to the supervisor two weeks, and no later than 10 days, prior to submission in order to allow plenty of time for the supervisor to read and comment on the draft and for changes to be implemented. If the supervisor is likely to be away at this time the student and the supervisor should make alternative arrangements well in advance.

- Supervisors will keep a log of the amount and the nature of the project supervision that they give, and this will be passed on to the MSc Examiners/Dissertation Markers as part of a Supervision Report, along with the dissertation, when it is to be marked.

The above guidelines can be varied significantly for individual projects. For instance, where the project requires more frequent meetings at certain stages, in order for the project work to progress satisfactorily.

### 4.2 Industrially supervised projects

Students will meet with their external supervisor at (or before) the start of Trinity Term, for an initial meeting to discuss the project and the pattern of project supervision. The student will at this time also arrange a joint meeting with the external and internal supervisor. It is important that this joint meeting happens at the beginning of the project. It is used to establish the scope and nature of the project, data sources which will be used, agree on any procedures required prior to hand-in (e.g., sign off by the industrial partner's compliance team). Where anything is altered significantly from the original scope of the proposed project, the internal supervisor should be content the final project is suitable for a scholarly work. Equally, in this meeting the

overall parameters and patterns of supervision will be confirmed. In particular, the roles of the internal and external supervisor will be reaffirmed and clarified, so that all parties are not in doubt.

To be clear, the respective roles of the external and internal supervisors are as follows:

- The external supervisor will act as the technical supervisor of the project. For students doing an internship in the company, the supervisor often also acts as their line manager.
- The internal supervisor will act in an oversight role, getting updates from the student (and perhaps from the external supervisor, if appropriate) on the progress.

A typical supervision schedule will then be along the following lines:

- Regular meetings with the external supervisor, where the students offers updates on the progress and receives ongoing guidance. These could be as often as daily for office based internships, but should not be less frequent than one hour fortnightly.
- The student (and external supervisor if appropriate) will update the internal supervisor on a fortnightly basis, to confirm that the project is progressing reasonably satisfactorily. These updates need not be long and can be done via email. If all is progressing well, these updates can merely confirm this to the internal supervisor, so that the oversight role is being met satisfactorily.
- Initial, mid-term and final meetings with the student and both external and internal supervisor are typically envisaged.
- A draft of the dissertation should be given to the external supervisor at least two weeks prior to submission in order to allow plenty of time for the external supervisor to read and comment on the draft and for changes to be implemented. Any compliance procedures should be initiated suitably in advance.
- The corrected draft is shared with the internal supervisor at least 10 days before the submission deadline. The internal supervisor will offer detailed feedback on a) suitability of the work for the final dissertation (such feedback would have also been given initially and in the mid-term meeting) and b) on the scholarly quality of the final writeup.
- Towards the end of the project, both supervisors and the student hold their final meeting to discuss the outcomes of the project. The internal supervisor should be given a final progress update, with an estimate of the contact hours taken up by meetings, and the amount and the nature of the project supervision that has been given. This will enable the internal supervisor to record this as part of a Supervision Report that will be passed on to the MSc Examiners/Dissertation Markers, along with the dissertation, when it is to be marked.

The above guidelines can be varied, and in particular the frequency of meetings with the external supervisor may vary greatly depending on the environment and dissertation project setup.

The internal supervisor will not ordinarily be involved in the detailed technical supervision of the project. It is the responsibility of the student to keep the internal supervisor appraised

of progress. In particular, the student should let their internal supervisor know if they feel their external supervisor is not providing a reasonable level of supervisory support. In such (hopefully, rare) cases, the internal supervisor can ask the external supervisor to make themselves available to give the student the needed guidance and feedback. In the very rare extreme cases where both the internal supervisor and the student agree that the external supervision is not working satisfactorily, they will seek the course director's guidance on the best ways to remedy this.