MSc in

Mathematics &
Foundations of Computer Science

Handbook 2023-2024

This handbook applies to students starting the MSc in Mathematics and the Foundations of Computer Science in Michaelmas term 2023. The information in this handbook may be different for students starting in other years.

The Examination Regulations relating to this course are available at https://examregs.admin.ox.ac.uk/

If there is a conflict between the information in this handbook and the Examination Regulations then you should follow the Examinations Regulations. If you have any concerns please contact mfocs@maths.ox.ac.uk.

The information in this handbook is accurate as at September 2023, however it may be necessary for changes to be made in certain circumstances, as explained at www.graduate.ox.ac.uk/coursechanges. If such changes are made the department will publish a new version of this handbook together with a list of the changes and students will be informed.

Welcome

The M.Sc. in Mathematics and the Foundations of Computer Science builds on Oxford's strengths in pure mathematics, logic, and theoretical computer science.

It benefits from the synergies and close relationships between the Mathematical Institute and the Department of Computer Science in Oxford. It offers training spanning these fields, and prepares students for two main tracks: Ph.D.-level research, or careers in the research-led IT and communications industries.

You will find the course challenging and quite intensive, but also stimulating and rewarding. You will also find that you are part of a cohort of highly motivated and enthusiastic students.

I hope that you will enjoy the course, and make the most of the opportunities it offers!

Paul Goldberg, Course Director

Please follow The Mathematical Institute on Linkedin at; https://www.linkedin.com/school/oxford-mathematics/

Contents

1 Introduction

This handbook contains important information about the MSc course in Mathematics and the Foundations of Computer Science. It is intended as a guide and reference for you throughout the course. There are a number of other sources of information that you will need to refer to during your course and links to these are given below, together with a list of key contacts.

1.1 Key Sources of Information

Course website: http://www.maths.ox.ac.uk/members/students/postgraduate-courses/msc-mfocs.

The course calendar and the online course handbook can all be found here.

Mathematical Institute website: http://www.maths.ox.ac.uk/.

Department of Computer Science website: http://www.cs.ox.ac.uk/.

Examination Regulations: https://examregs.admin.ox.ac.uk/. The University's examination regulations govern all academic matters within the University and contain the general regulations for the conduct of University examinations, as well as specific regulations for each degree programme offered by the University.

Examination Conventions: The examination conventions for the course set out how each unit will be assessed and how the final degree classification will be derived from the marks obtained for the individual units. The examination conventions can be found online at http://www.maths.ox.ac.uk/members/students/postgraduate-courses/msc-mfocs/information-current-students.

Oxford Student website: http://www.ox.ac.uk/students. This website provides access to information, services and resources.

University Student Handbook: http://www.proctors.ox.ac.uk/handbook/handbook/. This contains general information and guidance about studying at the University of Oxford, and gives you formal notification and explanation of the University's codes, regulations, policies and procedures.

College Handbook: The handbook for your college will be available on the college website.

1.2 Key Contacts

Course Director Prof. Paul Goldberg (tel: (6)10756) [email: paul.goldberg@cs.ox.ac.uk](mailto:paul.goldberg@cs.ox.ac.uk)

MSc Course Administrator Laura Auger (tel: (2)80612) [email: mfocs@maths.ox.ac.uk](mailto:mfocs@maths.ox.ac.uk)

Deputy Head of Academic Administration (tel: (6)15208) [email: graduate.studies@maths.ox.ac.uk](mailto:graduate.studies@maths.ox.ac.uk)

Head of Academic Administration - Maths (tel: (6)15203) [email: acadadmin@maths.ox.ac.uk](mailto:acadadmin@maths.ox.ac.uk)

Academic Administrator - Computer Science Rachel Breward (tel: (2)73833)
[email: rachel.breward@cs.ox.ac.uk](mailto:rachel.breward@cs.ox.ac.uk)

Mathematical Institute Reception (tel: (2)73525)

Department of Computer Science Reception (tel: (2)73838)

As a graduate student you will have access to an MS Teams account. MS Teams and emails are the most common means of communication between students and staff in addition to the phone numbers above.

1.3 The Academic Year

The course lasts three terms and each term lasts eight weeks, from the beginning of October to the end of the following June. The University functions throughout the year and as a graduate student you will need to work in vacation as well as in term time (apart from reasonable breaks).

Note in particular that you should expect to remain in Oxford after the end of each term to work on mini projects or your dissertation, and also that you should return before the beginning of each term to discuss your programme with your supervisor, and for meeting the Course Director.

For the academic year 2023-2024, the course begins with an induction. The dates of the University Full Terms for the Academic Year 2023–2024 are:

MT = Michaelmas Term 2023: Sunday 8 October – Saturday 2 December
HT = Hilary Term 2024: Sunday 14 January – Saturday 9 March
TT = Trinity Term 2024: Sunday 21 April – Saturday 15 June

A calendar of important dates is given in Appendix A.

1.4 Finding Your Way Around

Teaching for the course will take place in the Andrew Wiles Building, The Mathematical Institute, situated in the Radcliffe Observatory Quarter. (http://www.maths.ox.ac.uk/about-us/travel-maps) and the Wolfson Building, Department of Computer Science (http://www.cs.ox.ac.uk/aboutus/contact.html).

A searchable, interactive map of all colleges, departments and libraries can be found at [https://www.ox. ac.uk/visitors/map](https://www.ox.ac.uk/visitors/map).

Access to the Wolfson Building

The Department of Computer Science is situated in the Wolfson Building, on the corner of Keble Road and Parks Road, with the main entrance on Parks Road. To access this building, you will need to have your University card activated. Please contact Ms Brenda Deeley at the Department of Computer Science to arrange this.

Access to the Andrew Wiles Building

An entry card system controls access to the building. Your University card, which you collect from your College at the beginning of term, will gain you access to the building and will operate the doors where they have security control. Instructions on how to activate your card will be made available to you at the Graduate induction. If your card fails to allow you access, please contact door-entry@maths.ox.ac.uk giving your name, card number and expiry date.

Rules governing access to the Mathematical Institute are as follows:

1. Cards are issued on a personal basis and must not be loaned or passed on to another person.

2. No-one should allow access to another person.

3. When a card is used to gain access to the building, the system keeps a record of that use for a period of approximately six months.

2 The MSc Course

2.1 Overview

The 12 month Master of Science in Mathematics and the Foundations of Computer Science course (FHEQ Level 7) focuses on the interface between pure mathematics and theoretical computer science. The course is suitable for those who wish to pursue research in pure mathematics (especially algebra, number theory, combinatorics, general topology and their computational aspects), mathematical logic, or theoretical computer science. It is also suitable for students wishing to enter industry with an understanding of mathematical and logical design and concurrency.

It builds on Oxford's traditional strength in the foundations of theoretical computer science and in the related areas of mathematics that stem from the early days of the Programming Research Group in the Computing Laboratory.

The courses offered are divided into two sections:

- theoretical

- applicable

Theoretical courses are concerned with those areas of mathematics and computer science which are related to the general goals stated above. The range of courses may vary from year to year.

2.2 Aims

The aim of this MSc is to provide a wide grounding over a range of mathematics and computing science and the regulations are designed to ensure that this is achieved without too much specialisation, while giving students a good choice of options.

2.3 Learning Outcomes

During the course you will develop a knowledge and understanding of

- several topics in advanced mathematics and theoretical computer science

- some significant applications of modern mathematical and computational methods.

- a general perspective on mathematics and the foundations of computer science as active areas of research.

You will also have the opportunity to develop the following skills.

Intellectual Skills

- A working knowledge of high-level mathematical methods and their applications.

- The ability to develop mathematical ideas and investigations in an open-ended fashion.

Practical Skills

- Ability to apply abstract mathematical concepts to substantial specific examples.

- Ability to construct, write-up and communicate logical arguments of some complexity.

Transferable Skills

- Ability to solve problems effectively and to apply high-level mathematical and computational methods to a wide range of problems.

- Ability to manage your time and to acquire a complex body of knowledge in a limited time.

- Ability to manage your own learning and study for research or other professional qualifications.

2.4 Course Structure

The mathematical side of the course concentrates on areas where computers are used, or which are relevant to computer science, namely algebra, general topology, number theory, combinatorics and logic. Examples from the computing side include computational complexity, concurrency, and quantum computing.

The course will consist of examined lecture courses and a written dissertation. The lecture courses will be divided into two sections:

- Section A: Mathematical Foundations

- Section B: Applicable Theories

Each section shall be divided into;

- Schedule I - basic courses - The lectures may serve also as advanced undergraduate lectures, though students for an MSc should expect to read more widely around the material than would an undergraduate, and the written assignments set at the end of the course will be more searching than undergraduate examination questions, and will often allow the student to develop a theme.

- Schedule II - more advanced courses - Can be expected to lead into areas where students may choose to write dissertations. Some Schedule II courses will be offered as directed reading, rather than by lectures. Their content will be the equivalent of a standard course of sixteen lectures.

It is intended that a major feature of this course is that candidates should show a broad knowledge and understanding over a wide range of material. Consequently, each lecture course taken will receive an assessment upon its completion by means of mini projects. Candidates will be required to pass five courses, of which at least two shall be from Schedule II, and at least two from Section B (these need not be distinct). Details regarding the syllabus for each course are published online. Candidates must offer at least four courses from among those available in Michaelmas and Hilary Terms.

While it is necessary to pass five courses, and not more than four may be offered in any one term, the normal expectation is that students will take three or perhaps four courses in each of Michaelmas and Hilary terms. It should be noted that Schedule I courses will mainly be given in Michaelmas and Hilary terms, and Schedule II courses in Hilary and Trinity terms. Many courses provide problem sheets and associated classes; completion of such work (and its marking) forms an integral part of the course, and

students are assigned to such classes. Where this is not the case, either the lecturer or the supervisor (see below) will arrange a limited amount of 'tutorial-style' teaching to supplement lectures. (See also 'Reading Courses', section 3.4.)

The majority of these courses will be given in the first two terms. During Trinity term and over the summer students should complete a dissertation on an agreed topic. The dissertation must bear regard to course material from Section A or Section B.

During Trinity Term you should be focusing primarily on your dissertation, and are unlikely to have time to take more than one course for examination.

All students will be required to attend an oral examination. This will be held in the second half of September.

3 Teaching and Learning

3.1 Organisation of Teaching

Teaching for the course will be provided jointly by the Department of Computer Science and the Mathematical Institute through lectures and classes. All students are assigned a general supervisor (responsible for guiding the student's choices) for the duration of the course. Supervisors are chosen from amongst those with an interest in the programme and with the student's interests taken into account. In addition, students undertaking a dissertation will have regular supervision meetings with their dissertation supervisor.

Course Material

Course material, such as lecture notes and problem sheets, will be published on the Mathematical Institute's website and the Department of Computer Science website.

Mathematical Institute: https://courses.maths.ox.ac.uk/course/index.php?categoryid=139

Computer Science: http://www.cs.ox.ac.uk/teaching/courses/

3.2 Lectures

Each lecture course comprises of 16 hours of lectures, for most of these there will be 4x 90-minute classes.

In addition, students will be expected to undertake reading, and work on practical preparation and problem sheets. We would expect that you would spend about 10-15 hours per week on each course and that you would undertake 3 or 4 courses in each of Michaelmas and Hilary Terms. Reading courses involve the same amount of work as lecture courses.

The Mathematical Institute publishes a lecture list for Mathematical Sciences just before the beginning of each term, as do all other Divisions of the University. The Mathematics list can be found on the web at http://www.maths.ox.ac.uk/members/students/lecture-lists.

The Computer Science list can be found on the web at http://www.cs.ox.ac.uk/teaching/timetables/.

Lecture lists for other Departments in the MPLS Division can be found at https://www.ox.ac.uk/students/academic/guidance/lectures. All members of the University may attend any publicly announced University lectures or seminars.

3.3 Classes

Lecture courses will normally be accompanied by problem sets and weekly or fortnightly problem classes. Classes will usually contain 8–10 students. For classes accompanying mathematics courses you will need to sign up for the sets of classes you wish to attend at the start of each term. You will be sent an email in week 0 alerting you that class registration is open and providing you with details of the registration process. You can find out which class you have been allocated to by looking at the class lists (https://tms.ox.ac.uk).

Before each class you will need to submit your problem sheet to the class teaching assistant for marking. For all courses you should submit your problems sheets as instructed by the class tutor.

You should always submit your problem sheet before the stated deadline.

Please note that some classes will be joint with undergraduates. As an MFoCS student you should try to attend even week classes where possible, to fit around mini projects.

3.4 Reading Courses

Some courses may be offered by means of directed reading rather than as a formal course of lectures - such courses are of exactly the same standing as those delivered via lectures. The following notes, both for students and those giving the course, give a general outline of what should be expected.

1. The content of a Reading Course should, in quantity and expectation, correspond to a standard 16 lecture course given at the Schedule II level.

2. There should be a synopsis that states the aims and content of the course, together with the reading that will specify its content (but see (4) below).

3. The reading is guided - that is, the person offering the course should meet with the students on a regular basis to discuss the material being read and to give clear guidance as to what should be achieved before the next meeting.

   The exact format should be decided on a mutual basis. In practice, most people giving such courses will see all the students at the same time, on between four and eight occasions (either four 2-hour or eight 1-hour meetings).

   The majority of the time will be spent reviewing what has been read, and it is for the "lecturer" to see whether this is best spent by students presenting items, by reviewing the content briefly and answering questions as the lecturer goes alone, or by asking the students what particular aspects they may want explained. It is useful to conclude by discussing what is in the next "section" to be covered, with advice as to where problems may be expected or where suitable additional reading may be found. The first meeting, of course, should include a general outline of the goals of the course since at that stage some students may still be deciding whether to take the course.

4. It is permissible (i.e., without referring back to the Supervisory Committee) to vary the content of the course to reflect the interests of those taking the course, though all students should cover the same material for the purposes of preparing for the mini project - but "extra" reading may be assigned on an individual basis according to taste. This is particularly relevant when students may be looking for a dissertation in the area of the reading course. Many dissertations do in fact arise from reading courses.

5. If relevant and viable (especially with a view to the fact that a mini project will be set), problems or practical exercises may be set. The latter should, of course, be designed with the students' prior computing experience taken into account.

6. On occasion, extra reading courses may be approved by the Supervisory Committee during the year upon request. Students seeking such extra courses should discuss this with their supervisor, and also informally with the Chair prior to any formal request.

3.5 Advice on Teaching and Learning Matters

There are a number of people you can consult for advice on teaching and learning matters. Each student is assigned a supervisor who will offer direct guidance in the first instance. In particular, students are advised to discuss with their supervisors at an early stage which range of courses they intend to consider so that any

prerequisite knowledge can be acquired. They should also discuss with their supervisors later the area in which they intend to write the dissertation so that a suitable supervisor for that dissertation (who need not be the 'assigned' supervisor) can be approached to discuss possible topics. Students give a short presentation on their dissertation topic, late in Trinity Term or shortly thereafter. All students are expected to observe all presentations offered by their cohort. The dissertation is required to bear regard to some aspect of the material covered in lecture courses. All students will receive academic guidance from the Course Director.

If you have any issues with teaching or supervision please raise these as soon as possible so that they can be addressed promptly. Details of who to contact are provided in Section 8.2 Complaints and Appeals.

The committee who oversee the course currently consists of Prof. Paul Goldberg (Chair), Prof Oliver Riordan, Prof. Kevin McGerty, Prof. Michael Benedikt, Prof. Aleks Kissinger (CS internal), Prof. Ivan Tomasic (External member) and tbc (Student Representative) and Prof Christophe Reisinger (DGS-Teaching) Any member of the committee may be approached for guidance. (N.B. The committee membership may change from the beginning of the academic year. You will be informed if this is the case).

3.6 Skills and Learning Development

Expectations of Study

You are responsible for your own academic progress. Therefore, in addition to the formal teaching you receive through lectures, classes and dissertation tutorials, you will be expected to undertake a significant amount of self-directed, independent study both during term time and in the vacations. You are advised to read the University's guidance on undertaking paid work at http://www.ox.ac.uk/students/life/experience.

Your academic progress will be monitored by your supervisor. College tutors and supervisors will receive reports from the class tutors for the classes you attend. In addition, supervisors of MSc students will submit termly reports on their student's progress via the Graduate Supervision Recording (GSR). These reports are reviewed by the Director of Studies. If you are concerned about your academic progress please contact your college tutor, supervisor or the Course Director.

For MSc students, it is also mandatory to complete a self-assessment report via GSR for every reporting period. You can access GSR via the following link: https://www.ox.ac.uk/students/selfservice. Students will be sent a GSR automated email notification with details of how to log in at the start of each reporting window, and who to contact with queries.

Completing the self assessment will provide the opportunity to:

- Review and comment on your academic progress during the current reporting period

- Measure your progress against the timetable and requirements of your programme of study

- Identify skills developed and training undertaken or required

- List your engagement with the academic community

- Raise concerns or issues regarding your academic progress to your Academic Advisor

- Outline your plans for the next term (where applicable)

If you have any difficulty completing this you must speak to your Academic Advisor or Director of Studies. Your self-assessment report will be used by your Academic Advisor as a basis to complete a report on your performance this reporting period, for identifying areas where further work may be required, and for reviewing your progress against agreed timetables and plans for the term ahead. GSR will alert you by email when your Academic Advisor has completed your report and it is available for you to view.

University Lectures and Departmental Seminars

University lectures in all subjects are open to all students. A consolidated lecture list is available on the University website at: http://www.ox.ac.uk/students/academic/lectures/.

Seminars and colloquia given in the Mathematical Institute and Computer Science Department, often by mathematicians and computer scientists of international repute, are announced on the departmental notice boards
www.maths.ox.ac.uk/events/list/all
www.cs.ox.ac.uk/seminarsEvents.html

Study Skills

Much of the advice and training in study skills will come in the regular class teaching you receive. A wide range of information and training materials are available to help you develop your academic skills – including time management, research and library skills, referencing, revision skill and academic writing – through the Oxford Student website: http://www.ox.ac.uk/students/academic/guidance/skills

4 Examinations and Assessments

4.1 Assessment of the Course

All of the units you undertake will have a formal assessment (either a mini project or dissertation). The assessments are governed by the University's Examination Regulations and the course examination conventions. You will be asked to notify the course administrator of your intention to offer a mini project for a lecture course no later than the Monday of the third week of each term. This is distinct from the formal exam entry process detailed below.

4.2 Examination Conventions

The examination conventions for the course are the formal record of the specific assessment standards for the course. They set out how each unit will be assessed and how the final degree classification will be derived from the marks obtained for the individual units. They include information on marking scales, marking and classification criteria, scaling of marks, formative feedback, resits and penalties for late submission. The examination conventions for 2023–24 can be found online at http://www.maths.ox.ac.uk/members/students/postgraduate-courses/msc-mfocs/information-current-students . This is not the definitive version of the examination conventions for this year. They will be made definitive, once approved at the first supervisory committee meeting in Michaelmas Term. The examiners for the current academic year are listed in the Conventions. Students are strictly prohibited from contacting external examiners directly. If you are unhappy with an aspect of your assessment you may make a complaint or appeal (see section 8.2).

4.3 Examination Entries

You will need to formally enter for the units you wish to be examined on by completing an examination entry form. This is done online through Student Self Service (https://evision.ox.ac.uk/) and further information on the process can be found at https://academic.admin.ox.ac.uk/exams-and-assessments. For this course there will be three examination entry dates:
Thursday 30th November, week 8, Michaelmas Term for Michaelmas Term courses to be assessed by mini projects;
Thursday 29th February, week 7, Hilary Term for Hilary Term courses to be assessed by mini projects;
Thursday 6th June, week 7, Trinity Term for Trinity Term courses to be assessed by mini projects.

There is also an opportunity for a candidate to formally withdraw an examination entry via their College prior to the submission deadline. Although students can withdraw at any time before the submission deadline we would strongly recommend you withdraw at least 24 hours before the deadline.

4.4 Submission Deadlines

The calendar of important dates (Appendix A) gives the expected submission deadlines for the mini projects, dissertation and viva examinations.

It is vital that you submit your work by the given deadline as any late submission will be reported to the Proctors and the candidate shall be deemed to have failed the course in question.

Please see the examination conventions and the Oxford Student website (http://www.ox.ac.uk/students/ academic/exams/submission) for advice on what to do if you are unable to submit your work on time due to medical emergency or other urgent cause.

If for some reason you are granted an extension, please be aware that this may result in delaying your results.

4.5 Preparation and submission of Coursework

4.5.1 Mini Projects

It is generally recommended that mini projects be typeset (using LaTeX or a similar system), and for some courses typeset mini projects will be required. However, recognising that these have to be written within a fairly short period of time, some courses may allow hand written mini projects. In this case it is important that they be both legible and laid out in the same way as if they were typed.

It should be borne in mind that these are projects, not "examination solutions", and the presentation should reflect this -

1. Your submission should be clearly written in sentences with appropriate punctuation, display of formulae, appropriate use of 'Definition', 'Lemma', 'Theorem', 'Proof', etc.

2. You should begin with a brief statement of the overall goal of the project, and finish with a conclusion of what you have achieved (or needed to assume) and comment on what other questions your work might lead to.

3. You must not write your name on your mini project; the only identification should be your candidate number.

4. It is impossible to give precise guidance on length since this can vary considerably from project to project, depending on how much calculation may be needed and whether such is routine. It is unlikely, however, that a project can be completed in less than five pages, and it will more often be in the 10 - 15 page range. What is more important is that it should reflect the fact that you will be concentrating over a 2 - 3 week period on writing three or four projects and should represent a commensurate amount of work, bearing in mind that some reading may be required as part of the process (e.g., some projects may involve showing your understanding by extending a known result that you may not have seen before).

5. Mini projects may assume knowledge of the classes, please be aware that if you do not attend the classes you may be unable to complete a mini project on the topic.

If you have any questions about the mini projects (e.g., requests for clarification), please email the MSc Course Administrator (email: mfocs@maths.ox.ac.uk). **These will be passed as appropriate to the relevant Assessor and/or the Chair of Examiners. Any replies will be sent to all students taking that mini project. You must not communicate directly with the Assessor, nor discuss the projects with each other.**

Please note that formal assessments are marked but unfortunately we are **not** able to guarantee very detailed feedback.

4.5.2 Dissertations

These **must** be typed and the preferred length is between 35 to 65 pages. Dissertations may be printed double sided. It is recommended (though not obligatory) that LaTeX be used. You are advised to become familiar with this during the year if you are not already fully conversant with another word processing package that can handle mathematical formulae (and diagrams). The typing should follow the guidance for research theses (see Examination Regulations). The work should be properly and adequately referenced in the text, with the full list of references at the end of the dissertation, following any of the standard labelling conventions as mathematical papers (e.g., numerical, or by abbreviated name).

The dissertation does not require a separate abstract. However, it is strongly recommended that a short abstract (of less than one page) be included at the beginning of the dissertation, separate from the Introduction. It is important to highlight what new areas you are contributing within this abstract. The abstract may, but need not, be that submitted to the Chair of the Supervisory Committee for prior approval (though these will have been made available to the Chair of Examiners along with the title of the dissertation).

4.5.3 Submission of coursework

The deadline for submission of the dissertation is 12 noon on Thursday 29th August (Trinity Term) in the year of the examination.

Candidates must submit their mini projects and dissertations electronically via Inspera by 12 noon on the day of the submission deadline using the following link: https://oxford.inspera.com/.

Information on the procedure for this will be issued in the form of a notice to candidates from the chair of examiners. Ensure you are familiar with the online submission process in advance of any deadline. Full information is provided on the Oxford students website http://www.ox.ac.uk/students/academic/exams/submission.

4.6 Plagiarism

The University defines plagiarism as follows; presenting work or ideas from another source as your own, with or without consent of the original author, by incorporating it into your work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition, as is the use of material generated wholly or in part through use of artificial intelligence (save when use of AI for assessment has received prior authorisation e.g. as a reasonable adjustment for a student's disability). Plagiarism can also include re-using your own work without citation. Under the regulations for examinations, intentional or reckless plagiarism is a disciplinary offence.

Where the Chair finds that the matter can be dealt with by the Exam Board, assessors will mark the work on its academic merits. The Board may deduct marks for derivative or poorly referenced work. Boards are free to operate marks deductions of between 1 and 10% (maximum) of the marks available for that particular piece of work. Where the consequence of the marks deduction would result in failure of the assessment and of the programme (i.e. no resit opportunity) the case must be referred to the Proctors.

Please see the University's guidance on plagiarism
http://www.ox.ac.uk/students/academic/guidance/skills/plagiarism for further information.

4.7 Viva Examination

All students shall give an oral examination on their dissertation and its background material, and you will be expected to give a short 10-15 minute presentation on the dissertation, after which there will be an opportunity for the Examiners to ask questions. You are **not** permitted to use presentation slides although use of a whiteboard is permitted. You **must** wear sub-fusc and are advised to take a copy of your dissertation with you to your oral examination, students are permitted one A4 sheet of notes.

You are also expected to give a short presentation on your dissertation topic, late in Trinity Term or shortly thereafter. All students are expected to observe all presentations offered by their cohort. Slides **are** permitted.

4.8 Key Assessment Links

Examination Regulations: https://examregs.admin.ox.ac.uk/
Examination Timetables: http://www.ox.ac.uk/students/academic/exams/timetables
Online Submission: https://oxford.inspera.com/
Internal Examiners' Reports:
https://www.maths.ox.ac.uk/members/students/postgraduate-courses/msc-mfocs/quick-links/mfocs-internal-examiners-reports

External Examiners' Reports:
https://www.maths.ox.ac.uk/members/students/postgraduate-courses/msc-mfocs/quick-links/mfocs-external-examiners-reports

5 Role of the Supervisors

5.1 "General" supervisor

In assigning general supervisors, your background and indicated interests have been taken into account.

Your general supervisor will be responsible for guiding you through the course. You should see him/her almost as soon as you arrive, and in particular in the week before teaching actually starts, to discuss the range of courses that you propose to take. There is no need to know exactly at this stage but it is important to discuss your background in mathematics and/or computer science so that your supervisor can assess whether taking particular courses is realistic, and whether you are taking a sufficiently coherent set of courses (especially in the first term) to ensure a passage through the remainder of the year.

Your supervisor will also be able to give you guidance on material that they think is appropriate for you to study by yourself to prepare you for courses that you want to take, either by reading, or by attending undergraduate lecture courses that do not feature within the MFoCS list of courses. (This is especially true of courses given in Hilary term for which you may lack some of the prerequisites.)

More generally, you should keep in contact with your supervisor, and in particular let him/her know exactly which courses you finally decide to take for assessment. He/she is also the person who can give you general guidance.

During the second term in January, you should expect to have a preliminary discussion of the general area in which you will be hoping to write your dissertation. Often you will find that the most appropriate person to talk to after that is the person who has given lectures in that area, but your supervisor may well suggest that there are others to whom you should talk.

At this time too, your supervisor will provide you with some feedback on your performance in the mini projects on the previous term's courses, and will be the person who formally reports on your work to the Director of Graduate Studies for Taught Degrees and to your college.

Your general supervisor is also responsible for ensuring that you find a dissertation supervisor. This may seem a hard task, but in practice there has rarely been any difficulty at this stage. While then you will be working with your dissertation supervisor (primarily during Trinity term), your general supervisor will still be the person with overall responsibility for you, as before.

Those acting as general supervisors are experienced in the MFoCS programme and it is not necessary that they be experts in the particular direction that you plan to take; it may turn out that they will also be your dissertation supervisor, but this is most often not the case.

Your supervisor may not help you with your mini projects as such. However, he/she may answer general questions by directing you to appropriate reference material, but not to answer specific questions relating to the actual mini project. In the case where English is not your native language, supervisors are allowed to see a draft of mini projects and to comment on grammar, spelling and usage only.

Your general supervisor can also read and comment on a draft of your dissertation - especially with regard to its general presentation.

5.2 "Dissertation" supervisor

Your dissertation supervisor will guide you while you are preparing and writing your dissertation. Normally, students "find" their dissertation supervisor before the end of Hilary term so that they can start some specialised reading after completing that term's mini projects, and before the beginning of Trinity term. At the beginning of that term, you should prepare a "dissertation proposal" with your intended dissertation supervisor and submit it for approval. It is normal to have around eight meetings with your dissertation supervisor, mainly during Trinity term, but possibly continuing into July, but the exact arrangements are made mutually. Your supervisor will read and provide feedback on the initial draft of your dissertation (provided that it is submitted to them in good time!).

Your dissertation supervisor will normally be a faculty member or senior postdoc. If you would like to be supervised by someone more junior you should consult the Course Director, who will need to approve any such arrangement, possibly with the involvement of a more senior co-

supervisor.

Your dissertation supervisor should normally be based in the Mathematical Institute, the Department of Computer Science or the Department of Statistics; if you are considering a potential supervisor outside these departments or outside Oxford, you should consult the Course Director at an early stage. Also, if work on your dissertation should require you to work out of Oxford at any point during Trinity term, you **must** consult the Course Director before making any arrangements.

6 Resources and Facilities

6.1 Workspace

The M.Sc. in Mathematics and the Foundations of Computer Science has a dedicated student work-room, room N0.21, on the ground floor in the South Wing of the Andrew Wiles Building. The room contains a number of computers on the Mathematical Institute's IT network as well as space for students to use their own laptops, although there is not room for each student to have an individual desk.

6.2 Libraries

Whitehead Library, Mathematical Institute

Contact: Ms Cathy Hunt (Librarian) Email: library@maths.ox.ac.uk
Website: http://www.maths.ox.ac.uk/members/library

The Whitehead Library holds material covering mathematical topics at postgraduate and research level. It is primarily for the use of current postgraduate students and academic staff of the Mathematical Institute.

Your University Card will have been activated to open the library door and will give you 24/7 access.

Books taken out of the Library must be checked-out on the SOLO computer loan system at the terminal in the library. Please note that books are not allowed to be taken away from Oxford and should be returned to the library before you leave Oxford for vacation, or any other length of time.

Radcliffe Science Library (RSL)

Website: https://www.bodleian.ox.ac.uk/libraries/vhl/rsl

The Radcliffe Science Library is the science library of the Bodleian and includes mathematics books at graduate and research level.

College Libraries

You will have access to the library in your own College

Oxford Libraries

Information about all Oxford Libraries can be found at:

https://www.bodleian.ox.ac.uk/libraries

6.3 Computing Facilities

Information regarding the University's IT Services can be found at http://www.it.ox.ac.uk/.

IT and Email accounts

At the departmental induction session you will be given a Mathematical Institute IT account and email address. The email address will be of the format

firstname.lastname@maths.ox.ac.uk.

MSc students will also receive a University 'single-sign-on' IT account. This will have an email address associated with it which will be of the format

firstname.lastname@college.ox.ac.uk.

It is important that students either read both these emails regularly or set up a forward from them to an account which they do read regularly.

For further information about Departmental IT matters, including rules and regulations surrounding the use of IT facilities, please see http://www.maths.ox.ac.uk/members/it

You will have access to various licences. For further details go to

http://www.maths.ox.ac.uk/members/it/software-personal-machines.

6.4 Careers Service

Careers guidance is provided by the *Careers Service* (http://www.careers.ox.ac.uk/), which also provides training in writing applications, interview techniques and analysis of transferable skills. The Careers Service provides information about occupations and employers, and advertises work experience opportunities.

In addition to its general programme, the Careers Service runs an annual 'Jobs for Mathematicians' half-day, in collaboration with the Mathematical Institute. At this event there are talks from alumni working in various industries and a talk for those interesting in continuing on to further postgraduate study. Further information about postgraduate study opportunities at the Mathematical Institute can be found at; https://www.maths.ox.ac.uk/study-here/postgraduate-study

7 Student Representation and Feedback

7.1 Student Representation

Students will be able to nominate a representative to sit on the Joint Supervisory Committee (JSC) which oversees the course. Volunteers will be sought at the Induction Session and an election held if necessary. The student representative will be able to raise matters with the JSC on behalf of the cohort.

7.2 Joint Consultative Committee with Graduates

Graduate students views are fed into the departmental structure via the Consultative Committee with Graduates. The committee's operation is described in the following standing order:

"There shall be a Consultative Committee with Graduates members reading for higher degrees, and the Directors' of Graduate Studies. There should be at least three junior representative from the DPhil in Mathematics and one junior representative from each taught MSc course and CDT offered by the department.

Committee members shall be elected from amongst graduate students admitted by the Mathematical Institute. Nominations and self-nominations shall be invited by circulating these graduate students electronically in Week 0 of Michaelmas Term. If necessary elections shall be held electronically during the first week of Michaelmas Term, with three days being given for voting. The one student with the most votes from each MSc and CDT and the three research students (DPhil) with the most votes, and the five remaining students (either MSc or DPhil) with the most votes will be elected. The Committee shall have the power to co-opt junior members such that membership is complete. The committee may operate, if necessary, without its full complement of places having been filled.

The committee shall be concerned with matters such as the syllabus, teaching arrangements, library facilities, office facilities, and the general aspects of examinations. It shall annually review examiners reports for the taught MSc's. Where items on the agenda are not relevant to or appropriate for taught masters' students items will be discussed on a separate agenda focusing on research degree matters. The Director of Graduate Studies(R) shall be the chairman of the committee. The Graduate Studies Administrator or another member of Mathematical Institute staff shall act as secretary to the committee. The Consultative Committee with Graduates reports to the Graduate Studies Committee.

The Committee shall be able as of right to address a communication direct to the Graduate Studies Committee, Departmental Committee, the Research Committee, or the Teaching Committee, of the Mathematical Institute depending on the matters involved. Unless the chairman shall order otherwise, the committee shall meet at 1pm on Tuesday in the third week of each Full Term."

Information can be found at;
https://www.maths.ox.ac.uk/members/students/postgraduate-courses/doctor-philosophy/consultative-committee-graduates

7.3 Opportunities to Provide Feedback

Students will be asked to complete questionnaires evaluating the teaching received for each unit. Please take time to complete these as your feedback is valuable for future course planning.
Students on full-time and part-time matriculated courses are surveyed once per year on all aspects of their course (learning, living, pastoral support, college) through the Student Barometer. Previous results can be viewed by students, staff and the general public at:
https://www.ox.ac.uk/students/life/student-surveys.

Students will also be asked to complete an end of year questionnaire for the course and are able to provide feedback on all aspects of the MSc.

7.4 Key Student Representation Links

CCG: https://www.maths.ox.ac.uk/members/students/postgraduate-courses/doctor-philosophy/consultative-committee-graduates

Oxford SU: http://oxfordsu.org/

University Surveys: http://www.ox.ac.uk/students/life/student-surveys

8 Student Support and Academic Policies

8.1 Where to Find Help

Generally speaking for graduate students' departments are the main source of academic support and colleges are the main source of pastoral support.

If you have missed a number of lectures through illness or other reasons, please consult with your supervisor for advice on catching up missed work. If you are ill and unable to attend a class please inform the class tutor in advance of the class.

Every college has their own systems of support for students, please refer to your College handbook or website for more information on who to contact and what support is available through your college.

Details of the wide range of sources of support available more widely in the University are available from the Oxford Students website (http://www.ox.ac.uk/students/welfare), including in relation to mental and physical health and disability.

8.2 Complaints and Academic Appeals

The University, the MPLS Division and the Mathematical Institute and the Department of Computer Science all hope that provision made for students at all stages of their course of study will result in no need for complaints (about that provision) or appeals (against the outcomes of any form of assessment).

Where such a need arises, an informal discussion with the person immediately responsible for the issue that you wish to complain about (and who may not be one of the individuals identified below) is often the simplest way to achieve a satisfactory resolution.

Many sources of advice are available from colleges, departments and bodies like the Counselling Service or the Oxford SU Student Advice Service, which have extensive experience in advising students. You may wish to take advice from one of those sources before pursuing your complaint.

General areas of concern about provision affecting students as a whole should be raised through Joint Consultative Committees or via student representation on the faculty/department's committees.

Complaints

If your concern or complaint relates to teaching or other provision made by the faculty/department, then you should raise it with the Director of Graduate Studies, Prof. Marc Lackenby. If your concerns relate to the course as a whole, rather than to teaching or other provision made by one of the faculties/departments, you should raise it with Prof Paul Goldberg, Chair of the Joint Supervisory Committee for the course. Complaints about departmental facilities should be made to the Director of Administration and IT (Dr Keith Gillow). If you feel unable to approach one of those individuals, you may contact the Head of Department/Faculty (Prof. James Sparks). The officer concerned will attempt to resolve your concern/complaint informally.

If you are dissatisfied with the outcome, you may take your concern further by making a formal complaint to the Proctors under the University Student Complaints Procedure (https://www.ox.ac.uk/students/ academic/complaints).

If your concern or complaint relates to teaching or other provision made by your college, you should raise it either with your tutor or with one of the college officers, Senior Tutor, Tutor for Graduates (as appropriate). Your college will also be able to explain how to take your complaint further if you are dissatisfied with the outcome of its consideration.

Academic Appeals

An academic appeal is an appeal against the decision of an academic body (e.g. boards of examiners, transfer and confirmation decisions etc.), on grounds such as procedural error or evidence of bias. There is no right of appeal against academic judgement. If you have any concerns about your assessment process or outcome it is advisable to discuss these first informally with your subject or college tutor, Senior Tutor, course director, director of studies, supervisor or college or departmental administrator as appropriate. They will be able to explain the assessment process that was undertaken and may be able to address your concerns. Queries must not be raised directly with the examiners. If you still have concerns you can make a formal appeal to the Proctors who will consider appeals under the University Academic Appeals Procedure (https://www.ox.ac.uk/students/academic/complaints).

8.3 Student Societies

There are number of Mathematics and Computer Science student societies which you may like to join. Details of the main societies are given below. In addition there are also over 400 clubs and societies covering a wide range of interest which you may join or attend. A full list is available at http://www.ox.ac.uk/ students/life/clubs/list.

Invariants

The Oxford University's student society for Mathematics. The society promotes Maths and hosts informal lectures, often given by leading mathematicians. Website: https://www.invariants.org.uk.

Mirzakhani Society

The Mirzakhani Society is a society aimed at supporting women in Oxford who are studying maths. Their main event is 'Sip and Solve' which happens once a week, tea and cake are provided, and women are encouraged to come along to do problem sheets. Contact: mirzakhanisociety@gmail.com.

LGBTI∧3

LGBTI∧3 is the student group for all LGBTQ+ identifying students in Maths, Stats and Computer Science. They meet regularly for tea, biscuits and a chat. Contact: oxlgbtqubed@gmail.com.

The Oxford Women in Computer Science Society
The Oxford Women in Computer Science Society (OxWoCS) aims to support and promote women in computer science. The society exists for all women in computer science, be they students, faculty, or staff. OxWoCS runs a number of academic, social, and career events throughout the year, including weekly coffee meetings, talks by distinguished female speakers, and industry sponsored events. The society provides networking opportunities and a support network comprising role models, mentors,

and peers. OxWoCS exists to help enhance the quality of life for all members of the department. Website: https://www.cs.ox.ac.uk/societies/women/.

The Oxford University Computer Science Graduate Students Society

The Oxford University Computer Science Graduate Students Society (CoGS) provides a platform for the academic and social life of post-graduates in the department. They cover both student representation on several departmental and divisional committees as well as organization of a variety of social events. The latter provide an excellent opportunity for MSc students, DPhil students and post docs to mingle and catch up outside their research groups. Website: https://www.cs.ox.ac.uk/societies/COGS/.

8.4 University Policies

The University has a wide range of policies and regulations that apply to students. These are easily accessible through the A–Z of University regulations, codes of conduct and policies available at http://www.ox.ac.uk/students/academic/regulations/a-z. Particular attention is drawn to the following University policies:

Equal Opportunities Statement: https://edu.admin.ox.ac.uk/

Intellectual Property Rights:
https://www.ox.ac.uk/students/academic/guidance/intellectual-property

Code on Harassment: https://edu.admin.ox.ac.uk/harassment-advice

Policy on Plagiarism: http://www.ox.ac.uk/students/academic/guidance/skills/plagiarism

Policy on recording lectures by students: https://academic.admin.ox.ac.uk/policies/recording-lectures-other-teaching-sessions

8.5 Departmental Safety Policies

You are urged to act at all times responsibly, and with a proper care for your own safety and that of others. Departmental statements of safety policy are posted in all departments, and you must comply with them. Students should note that they (and others entering onto departmental premises or who are involved in departmental activities) are responsible for exercising care in relation to themselves and others who may be affected by their actions.

In the Mathematical Institute accidents should be reported immediately to reception, telephone 73525, who keep the accident book. There is a first aid room located on the ground floor of the South wing. If you require access to this room please report to reception.

Each lecture theatre has its own proper escape route and you are urged to familiarise yourself with these. Those for the Mathematical Institute lecture and seminar rooms, are set online at https://www.maths.ox.ac.uk/members/building-information/security-safety-and-reporting-building-issues

In the case of evacuation of the lecture theatre give heed to the instructions of the lecturer.

8.6 Key Student Support Links and Contacts

Co-ordinator (Mathematics): Charlotte Turner-Smith (academic.administrator@maths.ox.ac.uk)

Disability Co-ordinator (Computer Science): Rachel Breward (rachel.breward@cs.ox.ac.uk)

University's Disability Advisory Service: http://www.ox.ac.uk/students/welfare/disability

Counselling Service: (tel: (2)70300) email: counselling@admin.ox.ac.uk

Proctors' Office: (tel: (2)70090) email: proctors.office@proctors.ox.ac.uk

Departmental Harassment Advisors: names and contact details displayed in Mezzanine Study Room.

Oxford University Student Union, Vice President (Welfare): (tel: (2)88452) email: welfare@ousu.ox.ac.uk

Appendices

A COURSE CALENDAR

Michaelmas Term

3 October, (Tuesday of week 0)	Induction
9 October, (Monday week 1)	Michaelmas term lectures begin
23 October, (Monday week 3)	Deadline to confirm course choices
30 November 12pm, (Thursday week 8)	Examination entry for all Michaelmas term courses
1 December, 12pm (Friday week 8)	MT Mini Projects released
1 December, (Friday week 8)	Michaelmas term lectures end
5 January, 12pm (Friday week 13)	Deadline to submit Michaelmas term mini projects

Hilary Term

15 January, (Monday week 1)	Hilary term lectures begin
29 January, (Monday week 3)	Deadline to confirm course choices
TBC (week 4)	Workshop on dissertation preparation and procedures
29 February, 12pm (Thursday week 7)	Examination entry for all Hilary term courses
8 March, (Friday week 8)	Hilary term lectures end
8 March, 12pm (Friday week 8)	HT Mini Projects released
5 April, 12pm (Friday HT week 12)	Deadline to submit Hilary term mini projects

Trinity Term

22 April, (Monday week 1)	Trinity term lectures begin
3 May, 12pm (Friday week 2)	Deadline to submit a dissertation proposal
6 May (Monday week 3)	Deadline to confirm course choices
6 June, 12pm (Thursday week 7)	Examination entry for all Trinity term courses
14 June, (Friday week 8)	Trinity term lectures end
14 June, 12pm (Friday week 8)	TT Mini Projects released
Week 7, TBC	Provisional dates for student presentations on dissertations
12 July, 12pm (Friday week 12)	Deadline to submit Trinity term mini projects

Long Vacation

Thursday 29 August, 12pm	Deadline to submit dissertations
September, week beginning 16th Sept, TBC	Dates for viva examinations

B COURSES OFFERED IN 2023/2024

Section A

Schedule I

Algebraic Topology	Prof Andre Henriques	MT
Algebraic Number Theory	Prof BenGreen	HT
Analytic Number Theory	Prof James Maynard	HT
Analytic Topology	Prof Rolf Suabedissen	MT
Category Theory	Prof Dan Ciubotaru	MT
Commutative Algebra	Prof Damian Rössler	HT
Differentiable Manifolds	Prof Dominic Joyce	MT
Godel Incompleteness	Prof Robin Knight	HT
Introduction to Representation Theory	Prof Konstantin Ardakov	MT
Lambda Calculus and Types (CS)	Prof Bartek Klin	HT
Lie Algebras	Prof Kevin McGerty	HT
Lie Groups	Jay Lotay	MT
Model Theory	Prof Jochen Koenigsmann	MT
Topology and Groups	Prof Andras Juhasz	MT

Schedule II

Algebraic Geometry	Prof Damian Rössler	MT
Axiomatic Set Theory	Dr Robin Knight	HT
Geometric Group Theory	Prof Cornelia Drutu	HT
Homological Algebra	Dr Kobi Kremnitzer	MT
Infinite Groups	Prof Cornelia Drutu	MT
Introduction to Schemes	Mura Yakerson	HT
Low Dimensional Topology	Prof. Andras Juhasz	HT
Non-Commutative Rings	Prof Nikolay Nikolov	HT
Representation Theory of Semisimple Lie Algebra	Dr Andre Henriques	HT
Topological Groups (bespoke maths)	Prof Tom Sanders	TT

Section B

Schedule I

Categories, Proofs and Processes (CS)	Prof Aleks Kissinger and Dr Matty Hoban	HT
Computational Complexity	Prof Rahul Santhanum	HT
Graph Theory	Prof. Paul Balister	MT
Information Theory	Prof Sam Cohen	MT
Integer Programming	Prof Raphael Hauser	MT
Introduction to Quantum Information	Prof Artur Ekert	HT
Quantum Processes and Computation (CS)	Prof Aleks Kissinger	MT

Schedule II

Additive Combinatorics	Prof Ben Green	MT
Algorithmic foundations of collective decision making	Prof Edith Elkind	HT
Applied Category Theory * (bespoke maths)	Dr Carmen Constantin	TT
Combinatorics	Dr Gal Kronenberg	MT
Computational Algebraic Topology	Prof Vidit Nanda	HT
Computational Game Theory (CS)	Prof Michael Wooldridge	MT
Computational Learning Theory (CS)	Dr Varun Kanade	MT
Classical and quantum compositional distributional meaning *(bespoke maths)	Prof Bob Coecke	HT
Distributed processes, types and programming (CS)	Prof Nobuko Yoshida	MT
Elliptic Curves	Dr James Newton	HT
Geometric Deep Learning	Prof Michael Bronstein	HT
Networks	Dr Peter Grindrod	MT
Probabilistic Combinatorics	Prof Oliver Riordan	HT
Quantum Software (CS)	Prof Aleks Kissinger	HT

*These courses are offered as directed reading courses, with syllabuses provided as in the case of lecture courses. There may be one or two more reading courses to be added later.

WE REGRET THAT DUE TO TIMETABLING RESTRICTIONS THERE WILL BE A NUMBER OF CLASHES BETWEEN LECTURE COURSES. PLEASE CHECK THE LECTURE TIMETABLE CAREFULLY.