



DEPARTMENT OF
**COMPUTER
SCIENCE**

MSc COMPUTER SCIENCE

COURSE HANDBOOK 2019-20

Version 1

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1. Preface

This Course Handbook applies to MSc in Computer Science students starting the course in Michaelmas term 2019. The information in this handbook may be different for students starting the course in other years.

The information here is designed to be general and relevant throughout your time at Oxford; further information on courses, practicals and projects will be given to you and/or made available on our web pages at appropriate times.

The Examination Regulations relating to this course are available at www.admin.ox.ac.uk/examregs/2019-20/mosbcincompsscic/studentview. If there is a conflict between information in this handbook and the Examination Regulations then you should follow the Examination Regulations. If you have any concerns please contact Tim Jones at tim.jones@cs.ox.ac.uk

The information in this handbook is accurate as at September 2019, however it may be necessary for changes to be made in certain circumstances, as explained at www.graduate.ox.ac.uk/coursechanges webpage. 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.

Comments on the contents of this handbook are always welcome, so please do not hesitate to send a note to any of us if you can think of ways to improve the next issue.

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Welcome! You have chosen to study at one of the world's leading centres for the development, application and teaching of computer science. You join a rapidly expanding group of researchers, lecturers, visitors and students who have been attracted to Oxford from all over the world.

The Department of Computer Science's reputation ranges from its fundamental research into computing methods and languages through to practical solution of engineering and scientific problems on the latest highly parallel computer architectures. Our wide-ranging collaborative work with leading industries in this country has been twice recognised by the rare honour of a Queen's Award for Technological Achievement.

During your study at Oxford, we hope to share with you some of the understanding which we have gained, both by our research into basic theory and by industrial collaboration. We hope too that you will be able to share with us - and with each other - our enthusiasm for the subject, and will enjoy developing your talents in this field. The development of computing at Oxford has been heavily supported by donations and sponsorship from our industrial partners. We have devoted our best efforts to the design of the courses you will take and to the perfection of our lecturing and teaching skills; when you leave, we are confident that you will have a sound basis for a productive and rewarding career.

This handbook aims to save time by giving you a certain amount of basic information which you would otherwise have to ask for or learn by experience, but it cannot tell you all you need to know. Do not be afraid to ask for further information or advice.

1.1 Handbook Version

Version 1.0: published on 1 October 2019.

4 Supervision

You will be allocated an academic supervisor and an advisor, both of whom are usually members of academic or research staff in the Department of Computer Science. During term you are expected to remain in **close** contact with your supervisor. You should meet with your supervisor for at least half an hour per fortnight. Your supervisor is your main academic contact on the course; your advisor is an additional contact who can help if your supervisor is unavailable or if you need a second opinion.

4.1 Graduate Supervision Reporting

Graduate Supervision Reporting (GSR) was introduced in 2018 to replace the Graduate Supervision System (GSS) used by supervisors to review, and comment on their students' academic progress each term. Students are also given the opportunity to comment on their progress. Access to GSR will be via Student Self Service <https://www.ox.ac.uk/students/selfservice>. You will receive an email notification with details of how to log in at the start of each reporting window.

It is mandatory to complete a self-assessment report every reporting period. If you have any difficulty completing it, speak to your supervisor or Director of Graduate Studies (DGS). Your self-assessment report will be used by your supervisor(s) when completing a report on your performance, for identifying areas where further work may be required, and reviewing your progress against agreed timetables and plans for the term ahead. GSR will alert you by email when your supervisor or DGS completes your report and it is available for you to view.

Use this opportunity to:

- Review and comment on your academic progress during the current reporting period;
- Measure progress against the timetable and requirements of your study programme;
- Identify skills developed and training undertaken or required;
- List your engagement with the academic community;
- Raise any concerns regarding your academic progress to your supervisor;
- Outline your plans for the next term (where applicable).

Students and supervisors are reminded that having a positive student-supervisor relationship is an important factor in student success. Research suggests that one of the strongest predictors of postgraduate completion is having expectations met within the student-supervisor relationship.

Oxford's approach to graduate study emphasises the individual student's ability to work independently, to take the initiative in exploring a line of research, or in acquiring a new skill or identifying and remedying a perceived area of weakness. Your supervisor will meet you at agreed times if you encounter particular problems or difficulties that you need to discuss.

If you have any issues with teaching or supervision please raise these as soon as possible so that they can be addressed promptly.

4.2 Guidance for MSc in Computer Science Students and their Supervisors

4.2.1. Responsibilities of the supervisor:

In agreeing to supervise an MSc student, the supervisor must recognise and accept the responsibilities both to the student and to the divisional board. Supervisors should meet with their new students ideally in 0th week but no later than the end of week 1.

The supervisor is responsible for assisting the student in the selection of options and ensuring that the student has the correct background for particular courses. There must be no significant overlap with courses already completed either at Oxford or elsewhere. Students have to submit a form by Monday of week 4 committing themselves to courses they will definitely follow. This has to be countersigned by the supervisor. The supervisor is also responsible for advising the student about attendance at classes and requisite techniques (including helping to arrange special instruction where necessary).

The supervisor should meet with the student regularly i.e. a minimum of half an hour per fortnight. Times should be fixed to ensure that a busy supervisor does not inadvertently find that meetings are less frequent than the student would like, and to give sufficient time for the student to discuss the work and for the supervisor to check that certain things have been done. Informal day-to-day contact should not be seen as a substitute for formal scheduled meetings. The supervisor should also be accessible to the student at other appropriate times when advice is needed.

During meetings the supervisor should ask to see the student's class work and practical work and ensure that they understand the demonstrator's notes. If a student exhibits a consistent weakness and misunderstanding, supervisors should inform the Head of Student Administration and the Director of the MSc as soon as possible so that the arrangement of extra special supervision can be authorised.

The supervisor should tell the student from time to time how well, in the supervisor's opinion, the work is progressing, and try to ensure that the student feels properly directed and able to communicate with the supervisor. It is essential that when problems arise, corrective action is clearly identified and full guidance and assistance are given to the student.

If the supervisor is unable to see a student due to unforeseen circumstances they should inform the MSc Course Administrator so that alternative arrangements can be made.

If a student regularly fails to keep appointments the supervisor should inform the MSc Course Administrator who will inform the Tutor for Graduates at the student's college and the Director of the MSc. This applies especially to project supervisions.

The supervisor is required to report on the student's work at the end of each term. Each report should state the nature and extent of recent contact with the student. The report should also make clear whether the student is making satisfactory progress. Report forms should be completed in a timely manner i.e. returned to the University offices before the beginning of the following term.

4.2.2. Responsibilities of the student:

The student must accept his or her obligation to act as a responsible member of the University's academic community.

The student should take ultimate responsibility for his or her studies and develop an appropriate working pattern, including an agreed and professional relationship with the supervisor. The student should discuss with the supervisor the type of guidance and comment which he or she finds most helpful and agree a schedule of meetings.

The student should make appropriate use of the teaching and learning facilities available within the University. Students should make full use of the facilities for career guidance and development and should consult their supervisor for advice where appropriate.

It is the student's responsibility to seek out and follow the regulations relevant to his or her course, including faculty/departmental handbooks/notes of guidance, and to seek clarification from supervisors and elsewhere if this is necessary.

The student should not hesitate to take the initiative in raising problems or difficulties, however elementary they may seem. He or she should ensure that any problems regarding the project are drawn to the attention of the supervisor so that appropriate guidance may be offered.

If the student feels there are good grounds for contemplating a change of supervision arrangements, this should first be discussed with the supervisor or, if this is difficult, with the advisor, the Head of Student Administration or the Director of the MSc course.

The student should seek to maintain progress in accordance with the plan of work agreed with the supervisor. Both the student and the supervisor should keep a record of all formal, scheduled meetings. They may wish to agree a record of what has been discussed and decided.

The student should recognise that the supervisor may have many competing demands on his or her time. The student should give adequate notice of unscheduled meetings. The need for adequate notice also applies to requests for meetings from the supervisor.

The student should be aware that the provision of constructive criticism is central to a satisfactory supervisory relationship, and should always seek a full assessment of the strengths and weaknesses of his or her work.

Where problems arise it is essential that a student gives full weight to any guidance and corrective action proposed by the supervisor.

Students should ensure that they allow adequate time for writing up their dissertation and should not take up employment before the submission deadline. Particular attention should be paid to final proof reading.

5 MSc in Computer Science

5.1 Aims

The MSc in Computer Science at Oxford has been designed to teach a range of advanced topics and a carefully selected core of foundational subjects to graduates of computer science and other numerate disciplines.

The course aims:

- To provide a challenging and supportive learning environment that encourages high quality students to reach their full potential, personally and academically;
- To provide the foundation for a professional career in computing-based industries eg telecommunications, process control, business-, mission-and safety-critical fields;
- To enhance the skills of a professional who is already working in one of these industries;
- To provide a foundation for research into the theory and computing;
- To present knowledge, experience, reasoning methods and design and implementation techniques which are robust and forward-looking.

Entrants to the course come from a variety of backgrounds. Experienced programmers in industry and commerce will be motivated by the need for formal methods to overcome the problems of unreliable and inadequate software, or may wish to extend their understanding by studying new programming and development paradigms. Recent graduates in Computer Science will want to supplement their knowledge with the kind of sound mathematical basis which is not always found in undergraduate courses. Graduates in Mathematics, Science and Engineering will want to apply their training in the context of a rigorous application of the fundamental techniques of Computer Science.

Teaching for each topic is organised into formal lectures supported by problem sheets and practicals for individual study. Feedback (to students, supervisors, the Course Director and the Head of Student Administration) is initially given through graded classwork and supervised practical sessions. Problem sheets and practical work are designed to involve a mix of creative activity and selection of appropriate knowledge to apply to particular problems. Students can build on their understanding and develop their communication skills during class discussions of the problems set.

MSc Students will develop a knowledge and understanding of a formal disciplined approach to computer science; a range of relevant concepts, tools and techniques; and the principles underpinning these techniques and the ability to apply them in novel situations.

On subsequent employment, graduates of the course will be able to select techniques most appropriate to their working environment, adapt and improve them as necessary, establish appropriate design standards and sound practices for both hardware and software, pass on these standards and sound practices to colleagues and subordinates, and keep abreast of research and development.

5.2 Induction Arrangements

In 0th week students are provided with a comprehensive programme which includes familiarisation with the Department's Library and a separate talk about the University's Library

facilities; setting up computer accounts; familiarisation with the practical facilities; meetings with the Head of Department, Course Director, Academic Administrator, etc.

5.3 Length of Course

This is a full-time one-year course. Students are expected to work for about 44 to 46 weeks, but outside normal term time they might be working away from Oxford.

5.4 Course Selection

We hope that you will make a suitable selection of courses from among the many interesting topics that we offer. The choice should be related to the area of your subsequent dissertation but should not overlap with courses you followed in your undergraduate degree. Students typically study three courses per term. Those intending to study four courses should exercise caution. Students are allowed to take examinations in a maximum of four courses per term.

You are required to attain an average of at least 50 (pass) on a selection of your best six courses, including at most two courses from Schedule A and at least two courses from Schedule C. Students may take examinations in a maximum of four courses per term.

Choices have to be made in advance, when you have least information on which to base them, so it is important to consult your supervisor. However you need to have an average of at least 50 (pass) in your best four courses taken during Michaelmas and Hilary Term otherwise you will be deemed to have failed and will not be allowed to continue the course in Trinity Term.

For further information, please consult the Examination Regulations for this course:

www.admin.ox.ac.uk/examregs/2019-20/mosbcincompscic/studentview

A number of courses recommend pre-requisites: please check the relevant webpages. If you are in any doubt, consult the course lecturer or your supervisor.

It is a good idea to start discussing choices with your supervisor as soon as possible during your first week at Oxford. Your choices have to be approved by the Director of the MSc and, in this respect, there are certain deadlines laid down in the regulations to which you must adhere.

5.5 Important Dates

Written Exams

For courses that have written examinations they will be held on:

Written examinations for Michaelmas term courses week 0, Hilary Term

Written examinations for Hilary term courses week 0, Trinity Term

Written examinations for Trinity term courses week 7 (TBC), Trinity Term

Mini Projects (also known as take-home assignments)

Wednesday 8 January, 12 noon (Hilary Term, week -1): online submission deadline for Michaelmas Term mini-projects.

Monday 13 April, 12 noon (Trinity Term, week -1): submission deadline for Hilary Term mini-projects.

Tuesday 2 June, 12 noon (TBC) (Trinity Term, week 6): submission deadline for Trinity Term mini-projects.

Practical reports

Friday 29 May, 12 noon (Trinity Term, week 5): submit all of your practical reports.

Project Dissertation

Monday 2 March (Hilary Term, week 7): Submit your project dissertation registration form.

Monday 27 April (Trinity Term, week 1): You must submit an essay about the background and objectives of your project together with a plan of work. This is a strict deadline and must be adhered to. You will receive more information at the beginning of Hilary Term about the procedure for selecting your project. Your supervisor during Michaelmas and Hilary Terms will also provide you with advice. If you are experiencing particular difficulty, you should contact the MSc Course Administrator or the Academic Administrator.

Tuesday 1 September, 12 noon: online submission deadline for the dissertation.

Viva

Wednesday 30 September: viva voce examination date.

5.6 Hours of study

Typically a student would attend between 8 and 12 hours of lectures, 4-6 hours of practicals and 3 hours of classes a week. Please note that students are responsible for their own academic progress, and will be expected to complete 15-20 hours of private study each week. Students will be working during the vacation on their assignments and from April until the end of August students will be working on their project and dissertation.

5.6.1 Holidays

Please note that this is a full-time course and you will need to be in Oxford for most of the year. This means that you should not take on any other commitments during the year, e.g. it will not be possible for you to fit in any sort of employment. Also, before making any holiday arrangements please bear in mind that you will have to complete written assignments and

possibly attend one-week options outside of normal term. You should seek advice from your supervisor or the MSc Course Administrator/Head of Student Administration before booking holidays.

5.7 Timetables

The timetable for each term can be found on our web pages at:

www.cs.ox.ac.uk/teaching/timetables

5.8 Tutorial Classes

Each lecture course will have associated tutorial exercises and, in most cases, practical exercises as well. You are expected to attend the tutorial classes and any practical sessions for the courses you wish to follow.

The lecturer will provide you with the tutorial exercises. Your work on these exercises must be handed in by the required deadline for assessment by the person running the tutorial classes for that subject.

The timetable for these classes (and the associated deadlines) will usually be published on the Minerva database. Sign-up for classes is done entirely online at

<https://www.cs.ox.ac.uk/minerva/>

There will be multiple groups for the classes for each course and in some cases, there will be groups specifically for MSc students. Where possible, please sign-up for an MSc group but don't worry if your overall timetable prevents you from doing so.

There is usually one class per subject for each group starting in week 2 or 3, so you are likely to be attending 3 or 4 tutorial classes a week from week 3 onwards. It is also likely that you will have to hand in the first set of work for each of these subjects early in week 2.

The marks from the tutorial exercises will be passed to your supervisor for information. A record will also be held centrally to provide the Examiners with information on the extent to which each candidate has pursued an adequate course of tutorial class work.

5.9 Assessment and feedback

Formative assessment, defined as having "a developmental purpose and is designed to help learners learn more effectively by giving them feedback on their performance and on how it can be improved and/or maintained" (Quality Assurance Agency, 2006, p.35) is achieved in the MSc in Computer Science by means of classwork (see 5.8) and practical exercises (see 5 below). The marks you receive on your class and practical work will give you and your supervisor regular feedback on your progress, help you consolidate your understanding, and identify any areas of weakness.

Where a problem is identified, additional tuition may be provided either by the supervisor or, with the Course Director's approval, by the class tutor.

There will also be opportunities in both classes and practical sessions to receive informal feedback on your work by means of discussion with tutors or demonstrators.

Summative assessment, defined as being used to “indicate the extent of a learner’s success in meeting the assessment criteria used to gauge the intended learning outcomes of a module or programme” (QAA, 2006, p.36), of the taught part of the course is through a combination of take-home assignments or sit-down examinations (see 6 below), where appropriate, reports on practical work, and the dissertation (see 7 below).

You will receive a University Standardised Mark (USM) for each of the take-home assignments or sit-down examinations you complete, and for the dissertation. The criteria for USMs are published in the Examination Conventions:

www.cs.ox.ac.uk/teaching/examconventions/MSCinCS

You will receive written feedback on your dissertation after the final Examiners’ meeting in September. You will also receive feedback for your take-home assignments (but not for sit-down examinations) each term. You are welcome to consult past Examiners’ Reports to understand past cohorts’ performances on individual assignments and examinations:

<https://www.cs.ox.ac.uk/teaching/internal/examinersreports/MSCinCS.html>

Candidates must not contact the assessor with queries regarding feedback. Please refer to the Exam Conventions at www.cs.ox.ac.uk/teaching/examconventions/MSCinCS which state “Candidates should not under any circumstances seek to make contact with individual internal or external examiners.” If you have a query or complaint about the conduct of your examination, it must be raised with the Senior Tutor or equivalent at your college. Further information about this is available at www.ox.ac.uk/students/academic/complaints

6 Practicals

6.1 Practical Sessions

Practical sessions for courses organised by the Department of Computer Science take place in the Practicals Laboratory on level six of the Thom Building or in room 379 in the Department of Computer Science, where demonstrators will be present to assist you in overcoming any difficulties. The purpose of practical exercises for the Computer Science courses is to help you make sure you understand the application to practical programming of the theory that is taught in lectures; demonstrators at the practical classes are there to help you get the most from the sessions. You will find more information about how to sign up for practicals (signing up, signing off and submission of reports, assessment) in the Courses section of the website of the Department of Computer Science.

6.1.1 Timetable

Practicals usually start in week 2 of the term and there are normally four 2-hour sessions for each course during the term. During the first 2 weeks of the term you will be required to sign-up for a practical group. Most courses have 2 groups at different times in the week; you should choose the session that fits best with your timetable. Sign-up is done online using the Minerva database; you will be informed through the termly notices of how to sign up for classes and practicals. Sign up is on a first-come-first-served basis: there is a limit to the number of students in any group, which may mean you don't get your first choice of group.

There will usually be a number of exercises that you will need to complete for each course. For example, a course with two practical exercises might have a practical timetable as follows:

Weeks 2, 4 Classes for first practical exercise

Weeks 6, 8 Classes for second practical exercise

A similar pattern will be followed for each lecture course.

You might also need to work on the practicals in your own time, outside the scheduled practical sessions.

6.1.2 Attendance

Attendance at practical sessions is compulsory if you are to get full credit for practical work in the examinations. When you attend a practical session, you will find that specific machines have been reserved for the practical, and there will be a register for you to record your presence. You are expected to attend all the sessions for each practical until you have completed it. If you are unable to attend a practical session, for example because of illness, you should inform the demonstrator in charge ideally before each session. The course web pages will tell you who the demonstrator in charge is.

6.2 Writing Practical Reports

Each practical requires a report to be submitted for assessment. The report should not be a major burden: it is simply to provide evidence that you have done the work properly. Practical exercises usually give specific instructions as to what should be included in the practical report. In any case the following guidelines should be followed.

In many practicals, most of the report will be in the form of a program. Of course, you are expected to follow good programming practice:

- In a multi-module program, you should include some text explaining the role of each module, and the relationship between them;
- You should include suitable comments explaining the purpose of variables and procedures;
- You should also include comments to explain any interesting algorithms you have used: writing down an invariant will often help;
- You should make the code easy to read, for example by following standard indentation conventions, and by suitable use of white space;
- You should also include some evidence that the program works, for example by including sample output or screen shots: testing is a very important programming skill, and so you should show that you have considered suitable tests.

Many practicals will include specific questions for you to answer. Make your answers concise and relevant.

If the aim of the practical is to produce some experimental results, then you should present and discuss those. Do not just include pages and pages of numbers spewed out by the program. A concise summary is better, perhaps using another program to show the results are correct (by making a graph, say).

Try to avoid reproducing large volumes of code from the practical materials or repeating program code that you have already listed in the report. If a second program has to include the same procedure definition (say), just write "Procedure Sort(x) defined as before."

You are encouraged to write up reports on practicals as you do them during the term. The demonstrators will happily look at your reports and give you advice about them at the practical sessions, and will mark them there and then. It is perfectly acceptable to have your report marked at one practical session, then do further work on the practical and submit an improved report by the deadline. Please note that you must turn up at the beginning of the session in which you wish your practical to be marked: demonstrators will not have time and will not be willing to mark your practical if you turn up for only the latter part of the session.

You may want to produce the report using a text formatter like TeX or LaTeX, or a word processor. Be careful that the time you spend in formatting the document prettily does not distract you from getting the content right. A cogent, concise, neatly hand-written report is preferred to pages of word-processed verbiage. If you do produce a typed report, please ensure that it is legible, with adequate margins and with type that is no smaller than 10 points. While working on your practical, keep a record of the tests you performed on your program, so that you can easily copy relevant data into your report.

Do not copy any other person's practical report. You may have general discussions with other students about the practicals, but the code, test data and report must be all your own work.

6.3 *Signing off Practicals*

In order to have the demonstrator record that you have completed the practical, you must show them that you have done the work, perhaps by demonstrating a working program. In the ordinary way of things, you will have done the work in the lab with the demonstrator's help, and he or she will be able to check quickly that you have finished. You may prepare your practical work in advance and bring it for checking at the class, but the demonstrators will not check off your work unless you have been attending the practical classes.

6.4 *Assessment of Practicals*

When you have completed the work for a practical and the report on it, a demonstrator will check and mark your work at a practical session. They will ask you first to show that you have done the work, leaving aside any optional parts, and will record this fact in their register, together with your attendance at practical sessions. If a practical turns out to be very long or difficult, the demonstrators (with the advice of the course lecturer) may record the practical as complete if you have done a reasonable amount of work, even if you have not finished it.

The demonstrator will also mark your report, either at the practical session if there is time, or by taking it away and returning it later. The practical report will be marked, taking into account whether you have done any optional parts, as well as the quality of your write-up, and the general difficulty of the practical exercises. As a general guide, even an incomplete report on each practical in the course gains more credit than one where some practicals are entirely missing. Extra credit is awarded for completing optional parts of practicals, but not to such an extent that it is worth spending many hours finishing every optional part.

The following scale of marks is used by the markers; the descriptions attached to each mark indicate the rough level of performance expected, but may be adjusted to take into account the degree of difficulty of the practical exercise.

- S+ The student has either completed the compulsory parts of the exercise and submitted an exemplary report, or completed all parts of the exercise and submitted an adequate report.
- S The student has completed the compulsory parts of the exercise and submitted an adequate report.
- S- The student has completed only part of the exercise, or has submitted an inferior report.

Practicals are assessed in two ways: first, the demonstrators keep a record of who has attended the practical classes and completed each practical exercise associated with a lecture course; and second, you write a practical report that the demonstrators mark, and which you submit to the examiners.

The following percentages are allocated to the grades shown above:

- S+ 100%
- S 70%
- S- 30%

In examinations, the marks for practicals are treated separately from those for written papers. Practical marks do not affect the class of degree that you will be awarded, provided that you achieve a pass mark. However if you fail to reach the required standard in your practicals the examiners may deem you to have failed the examination.

All the practical reports must be submitted to the examiners at the end of the year. **You must submit them to the Examiners, via the MSc Course Administrator in the Department of Computer Science, by 12 noon on Friday of Week 5 of Trinity Term;** full details will be given nearer to that date. Note that reports should be anonymous: they should contain your candidate number, but not your name.

6.5 *Late Practicals*

Practicals are intended to support the lectures and tutorial work on a course, to help to impress material on your understanding, and to connect theory with practice. Accordingly, it is very much better to be doing the practicals for a lecture course at the same time as the other work on that course. Deadlines are set to help you to resist the temptation of putting off practicals.

Another advantage of doing your practicals during the scheduled classes is that the demonstrators are often able to spot problems that are affecting several people and do something about them, perhaps clarifying the instructions or providing a piece of missing information. If you do not attend the practical classes, you will not have access to this help.

Under the rules specified in the Examination Regulations, the Examiners will not take into account practical reports unless they have been "signed by a demonstrator". The demonstrators will sign the reports when they mark them.

The Examiners will give you no credit for practical work that was not submitted for marking by the deadline and signed by a demonstrator, unless there are extenuating circumstances. Likewise, demonstrators will not mark work that is late, unless there are extenuating circumstances.

6.6 *Difficulties*

If you are having difficulties in your practicals please make sure you speak to your supervisor or a member of the academic admin team as soon as possible.

7 Mini-projects (assignments) and Written Examinations

Lecture courses are examined either by mini projects (sometimes called take-home assignments) or by written examination.

7.1 *Mini-projects (take-home assignments)*

At noon on Friday of week 8 of each term you will be given mini-projects for each of the lecture courses for which you have registered that term and which are examined in this way. For courses that are shared with the MSc in Mathematics and Foundations of Computer Science, the assignments will be given out on Monday of week 8. Typically you will be given two to three weeks to complete all the assignments. The deadline for completion will be indicated on the assignment.

Note that the duration between the distribution and submission of assignments may vary by several days from term to term.

7.1.1 *Submission of Mini-projects*

Most assignments, including all mini-projects for courses taught in Michaelmas Term 2018, will be submitted electronically through WebLearn. Answers to any assignments with hard-copy submission should be submitted to the Chairman of Examiners via the Examination Schools to arrive by the date specified. Unless the answers are delivered by hand, students are advised to use registered post or a courier delivery service.

When submitting any mini-projects on paper, you will have to complete a Declaration Form attesting that they are your own work except where indicated; for work submitted electronically, there is an equivalent declaration to complete online when submitting. Failure to correctly acknowledge your sources is plagiarism, which is a very serious disciplinary offence. The consequences of copying can never be remedied. Please consult the University website regarding plagiarism (www.ox.ac.uk/students/academic/guidance/skills/plagiarism), and your supervisor if you are worried about possible suspicion of irregularity in examination procedures.

7.1.2 *Preparing Mini-projects*

A mini-project may take the form of a tutorial sheet with several questions on different topics from the course, or a group of tasks related to a single theme or topic from the course. While you are free to work until the hand-in date, the expectation is that you will spend around 2/3 days per assignment for topics under Schedules A and B, and around 3/4 days per assignment for topics under Schedule C, including preparatory reading.

Although mini-projects may be carried out while you are resident in Oxford, some may be prepared over the Vacation period. Students who wish to complete their assignments away from Oxford should make sure that they have access to adequate computing resources, including email.

You should aim to complete each assignment. However, even if you complete less than half of an assignment, you should still hand it in. Even if you fail in that subject, the work will earn you credit in the overall assessment. Furthermore, your work may suggest remedial action to your supervisor.

If prior to completing your examination entry online you think you will have trouble completing all the assignments, consider dropping one of them altogether. Be sure to discuss this with your supervisor. If you decide to drop an assignment you must inform the MSc Course Administrator. If you fail to submit a mini-project for one of the topics listed on your Exam entry, the Examination Schools will notify the Proctors that you have failed to submit it.

For more detailed information on examination entry and related information, please visit www.ox.ac.uk/students/academic/exams/entry and read section 7 of this handbook.

You should not show your work to, or discuss it with, any other student. **You should not** ask or seek to look at anybody else's work.

If you use material from any other source such as textbooks, lecture notes or the web then you should reference it explicitly at the relevant point. Your supervisor can give you guidance on proper referencing, or for more guidance see www.cs.ox.ac.uk/files/3161/Referencing.pdf

You will not receive any credit for simply copying information verbatim because that displays very little understanding. The assessors will be more impressed if you synthesise information from a number of sources (properly cited, of course), and combine it with your own ideas.

If you fail an assignment, it is possible to remedy the situation later; but the consequences of copying can never be remedied. Please consult your supervisor or the Course Director if you are worried about any possible suspicion of any irregularity in examination procedures. The following link offers additional relevant advice:

www.ox.ac.uk/students/academic/goodpractice/

When matters of plagiarism are reported to the Proctors, the investigations can be protracted and involve serious stress for the candidate(s) concerned. Penalties imposed can result in the assignment(s) being disregarded and this could ultimately mean failure of the degree course.

7.2 Written Examinations

In 2019-20, the following courses will be examined by written examination at the following times:

Computational Game Theory	week 0, Hilary Term
Databases	week 0, Hilary Term
Functional Programming	week 0, Hilary Term
Machine Learning	week 0, Hilary Term
Probabilistic Model Checking	week 0, Hilary Term
Artificial Intelligence	week 0, Trinity Term
Computational Complexity	week 0, Trinity Term
Knowledge Representation & Reasoning	week 0, Trinity Term
Concurrency	week 7 (TBC), Trinity Term

The finalised timetable will be made available at
www.ox.ac.uk/students/academic/exams/timetables

7.2.1 Preparation

Your supervisor and the course lecturer will advise you about revision and practice. There will be revision classes for courses examined in this way, and these tend to be held in week 9 of Michaelmas and Hilary Term.

Past examination papers are a good guide to the sort of examination question that you might be set. A word of caution: the syllabus for examinations changes over time, and is certainly not determined by what has appeared in past papers. Past papers can be found at:
<https://www.cs.ox.ac.uk/teaching/internal/papers/index.html>

7.2.2 Procedure for Written Examinations

Your written examinations will be held in the Examination Schools, at 75-81 High Street, Oxford, OX1 4GB (to the east of University College). A map showing this can be seen at
<https://maps.ox.ac.uk/#places/oxpoints:23233550>

Different papers take place in different rooms around the building, as detailed in the entrance hall.

You must wear full academic dress (sub fusc, gown and cap) to attend public examinations, and you must bring your University card with you. Your College will advise you about academic dress. For further guidance, please see www.ox.ac.uk/students/academic/dress

You should make every effort to be on time for examinations. If you are not there at the start of the examination, attempts will be made to contact your College or the Department of Computer Science to find out why not. Generally speaking there is no insurmountable difficulty if you get there in the first half hour, although you will have less time to do the exam. For this reason, nobody may leave an examination until half an hour after it starts.

Desks are identified by your name and college, with the desks in alphabetical order of names, but you will need to know your candidate number so that you can write this (and *not* your name) on your script when you hand it in. For each paper that you sit you will be given a cover sheet on

which you identify yourself by your candidate number, and the paper by its number and title. Although your college will provide you with your candidate number, it can also be viewed on Student Self Service. For guidance and how to locate your candidate number, see www.ox.ac.uk/students/selfservice

The question paper will be on your desk when you go in to the examination. You should check that it is the paper that you have entered for, and you should carefully read the instructions on the cover, but you may not open it until told to do so. Read the wording of each question carefully, and make sure that you have not missed out any parts.

You will be provided with (probably) booklets of ruled A4 paper in which to write your answers. The Exam Regulations require that you write in ink, rather than pencil, although you may use pencil for any graphs and drawings. It is a good idea to use blue or black ink, rather than something more unusual, in the interests of anonymous marking. Please start each answer on a new page. (This makes it much easier for the marker.) If you do start part way through a sheet, do not worry: just make a clear note of the fact so that the examiners can be careful not to be confused.

You must write legibly: if nothing else it will avoid annoying the marker; but there is a provision for illegible scripts to be typed *at the expense of the candidate*.

You will be given instructions at the examination about handing in your script. It is your responsibility to do this: anything left on your desk is liable to be thrown away by the person clearing the room. There will be treasury tags for you to use to attach booklets together. The rubric on the paper will tell you whether to bind everything in one bundle, or whether to hand in answers to different parts of the paper with separate cover sheets. If you do not attempt any questions from one part of the paper, you should still hand in a cover sheet for that part, so that the examiners can check that all parts of all papers are accounted for.

7.2.3 Entering for Examinations

Examination entry is an online process using Student Self Service. You will receive an email invitation to log into Student Self Service to complete your examination entry assessment selections by a given date. Your selections will be validated and confirmed by a series of display screens within Student Self Service, and you will be able to log back in and change your choices within the examination entry window as many times as you wish.

A couple of weeks before exams begin, a timetable will be sent to your College showing where and when each written paper will take place (this will also be available at www.ox.ac.uk/students/academic/exams/timetables). Your College will give you your timetable and a randomly allocated *candidate number* which you will use to identify your scripts, instead of your name and College, so they can be marked anonymously.

7.2.4 Notices to Candidates

Before your examination you will receive one or more letters of *notice to candidates* from the examiners which will tell you of any details of the examination procedure that are different from the usual. Notices to candidates will be sent to you by the MSc Course Administrator. These notices contain important information about your examinations and should be read very

carefully. If you have any questions then please ask the MSc Course Administrator; you must **not** contact the examiners directly.

Information on (a) the standards of conduct expected in examinations and (b) what to do if you would like examiners to be aware of factors that may have affected your performance before or during an examination (such as illness, accident or bereavement) are available on the Oxford Students website: www.ox.ac.uk/students/academic/exams/guidance

7.3 Prizes

As mentioned in the Examination Conventions

(www.cs.ox.ac.uk/teaching/examconventions/MScInCS) three prizes, each to the value of £200, may be awarded:

- One for best overall performance in the examination;
- One for best project; and
- The Richard Bird Prize for the dissertation that best presents a piece of software, an algorithm, or a mathematical theory pertaining to program construction.

If dissertations of sufficient merit are not submitted, the award may be withheld.

7.4 Examination Conventions: Marking and Classification

Examination conventions are the formal record of the specific assessment standards for the course to which they apply. They set out how your examined work will be marked and how the resulting marks will be used to arrive at a final result and classification of your award. They include information on: marking scales, marking and classification criteria, scaling of marks, progression, resits, use of viva voce examinations, penalties for late submission, and penalties for over-length work.

The definitive version of the Examination Conventions can be found online at:
www.cs.ox.ac.uk/teaching/examconventions/MScInCS

7.5 External Examiner and Examiners' Reports

The External Examiner responsible for the MSc in Computer Science is Professor Sara Kalvala, University of Warwick.

Previous years' Examiners' reports can be found online at:
www.cs.ox.ac.uk/teaching/internal/examinersreports/MScInCS.html

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.

8 Projects

8.1 Important Deadlines

- **Monday 2 March 2020 (Week 7, Hilary Term):** a project registration form must be submitted to us by this date.
- **Monday 27 April, 2020 (Week 1, Trinity Term):** a project proposal must be submitted.
- **Tuesday 1 September 2020, noon (Week -5, Michaelmas Term):** submission deadline.
- **Wednesday 30 September 2020 (Week -1, Michaelmas Term):** viva voce examination.

8.2 Choosing your project

Project proposals fall into two categories: there are specific proposals put forward by members of the department which can be discussed with the academic concerned, and some members of the department have put forward general areas in which they would be prepared to supervise projects. If you have a project of your own in mind you can discuss it with the academic whose interests fall into this area. The regulations stipulate that you must demonstrate a link between your project and the taught part of the course. Available projects can be found at www.cs.ox.ac.uk/teaching/studentprojects/MScinCS

You should submit the registration form with either a single project title, together with a signature of the supervisor, or a list of at least three projects for which you have (or are doing) the stated prerequisites. We would encourage you to talk to potential supervisors and select a specific project if possible. However, if you are not able to do this, then the Projects Committee will endeavour to find a suitable person to supervise one of the projects you have listed. If you do supply a list projects you are interested in, then please make sure that they are selected from at least two different possible supervisors. It is likely that your project supervisor will be different from your supervisor in the first two terms.

We encourage you to talk to potential supervisors and select a specific project if possible. You need not do a project from the circulated list; you are free to construct your own project proposal in consultation with someone who would be prepared to supervise it. A good way to start is to draft a description of what you propose to do as though it were going to be part of the circulated list, then show it to staff who you think might be interested in supervising it.

You should discuss with your supervisor the general area of your project, because this may help in selection of appropriate lecture modules through the year. The sooner you choose a specific project, the sooner you will be able to start background reading and investigations.

Although some students do projects that are jointly supervised with another department or industry, you should remember that the project has to be relevant to computer science and should demonstrate your understanding and ability to exploit and integrate the material you have learnt from the courses you have taken. If you are interested in undertaking a project supervised by an industrial partner, please consult the MSc Course Administrator or the Academic Administrator in the first instance, who will be able to advise.

You must submit a summary of your selected project to the Director of the course before the first Monday of Trinity Term (27 April 2020). This must be accompanied by an essay of one to two thousand words describing the project, including:

- Background: the theory or application areas;
- General open questions;
- Selection of particular question for study;
- Proposed method;
- Draft Timetable;
- Signature of Project Supervisor.

8.3 Carrying out the Project

During the project you should expect to meet your project supervisor for about half an hour per week, on average; however, this figure might vary, depending on the nature of the project. You should be proactive in arranging meetings with your supervisor.

8.3.1 Context and Scope

To decide on the exact scope of your project you first need to investigate the background and context of the area you are working on. Your project should address a well-chosen set of concerns that are appropriate to this context. Ideally, you should identify a small number of more difficult problems, and use your project as a vehicle to explore solutions to them.

For example, a program that allows human players to compete with each other in playing a game over a network might present a number of significant problems. The play will take place over a network that might be unreliable, or one or other player might quit the game before it is finished, and it would be important for the program not to become stuck if one of these things happened. For a multi-player game, players might be able to join or leave at different times, and it would be important that the program would continue to function. In a large game, it might become important to minimize the number of direct communication links that were used, and yet still have the program be robust to failure of computers or network links. Also, players may be able to act concurrently, and the outcome of concurrent activity must be determined by the program in an accurate and fair way.

It would not be necessary to address all these aspects in a project, but it would be good to show awareness of most of them and concentrate on some of them in your implementation and testing. It would be a mistake to devote too much effort to polishing the GUI at the expense of addressing the more fundamental networking and concurrency issues.

An MSc project should contain an original contribution, although not necessarily to the level of a research paper. For example, a project that involves implementing an algorithm or technique should contain a clear explanation of the underlying theory, a significant amount of testing, as well as evaluation and assessment of the different methods chosen.

Similarly, a project that contains an exposition of a recent development in theoretical computer science should contain an original presentation of the relevant theory, eg containing new illustrative examples and new, helpful, notation and terminology, and perhaps original proofs of certain propositions and lemmas.

8.3.2 Choice of Technology

The project should be implemented using appropriate technology. The report should contain a brief explanation of why the technical solution (such as a programming language and libraries) was chosen, but a long comparison of alternative approaches is unnecessary.

It is good to choose a technological basis that makes the programming easier, allowing you to concentrate on distinctive aspects of your problem area. For example, you could use a networking library that supports transmission of structured values instead of building the same functionality from scratch, and that would be sensible if the point of the project is some higher-level application. Or you could use a functional programming language to make a prototype of a compiler and abstract machine and avoid the heavy work of implementing these in low-level code.

8.4 Dissertations

The project is written up as a dissertation, which should give a clear account of an attempt to apply some of the principles taught in the course in practice. Students are encouraged to pay careful attention to the organisation of the material and the style of its presentation. Although the expected standard is that of a good internal project report in industry, some past dissertations have reached publication standard; others have been the starting points for research programmes.

8.4.1 Structure

The project is required to “demonstrate in the dissertation an appreciation of the role of methods studied in the course”. What this means in practice differs from project to project. For example, if the project is devoted to constructing a substantial piece of software, it will probably involve the development of formal specifications of the more crucial parts of the structure, attention to good software engineering practices in building the system, and possibly some reasoning about the result. If the project involves mathematical modelling of an artefact or process, the ideas would have to be put into a general context, relating them to material studied elsewhere in the course.

The main body of the dissertation should be preceded by a contents table listing chapters and sections. Each page should carry a header indicating the current chapter or section.

The main body of the text of a typical dissertation will contain:

- An introduction: the first chapter should introduce the subject of the dissertation and explain the structure of the text to the reader.
- An explanation of the problem: a second chapter should explain the problem to be studied, or the context in which the work takes place.
- A description of the method: a third chapter should introduce the method used to solve the problem, or the formal techniques employed.
- An account of the work: the following chapters should present the work carried out during the project, including any practical results and theoretical insights obtained.
- Conclusions: the final chapter should contain conclusions drawn from the project, comparisons which may be made between this and existing work or practice, and suggestions regarding the extension or continuation of the work.
- A bibliography and list of references.

Material that is used to support the work but does not have a place within the body of the text may be included as an appendix. Typical examples include program code, mathematical proofs, and sample output.

8.4.2 Guidance on Presentation

The following guidelines have been produced for MSc in Computer Science students to refer to when completing their dissertation. The University's Examination Regulations governing the preparation and presentation of a research thesis (currently under section 2 *Preparation and submission of theses* under the heading §7 *Regulations concerning the Examination of Graduate Research Students* at www.admin.ox.ac.uk/examregs/2019-20/grgoveresedegr) should be followed regarding the layout of your dissertation. However, as the MSc project is to be submitted online, the references to printing do not apply to the MSc. Please consult the latest edition of the Examination Regulations when reading this document, and before you start to type up your dissertation. Should any of the information be unclear, please contact Tim Jones (tim.jones@cs.ox.ac.uk) for advice in advance of the submission deadline.

Formatting

- Size 11 or 12 font must be used.
- Double spacing should be used for the main text; single spacing should be used for quotations and footnotes.
- The margins of the page must be 3 to 3.5cm.
- Pages of the dissertation must be numbered throughout, except for the title page.
- The completed dissertation must be saved and uploaded as a PDF file of not more than 250MB.

Title Page

- The full title of the dissertation.
- The term and year of submission.
- The candidate's number, but not name nor student number.
- The title of the degree the dissertation is being submitted under.

Contents

- You should include a contents page.

Abstract

- 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.

Source code

- If your dissertation contains or uses source code, that must be uploaded to the Assignments section of the Computer Science WebLearn site.
- With a file size limit of 250MB in WebLearn, please ensure you make a zip file of your source code before submitting it.
- Clear instructions for online submission of source code are included on the Assignments section of the Computer Science WebLearn site.

8.4.3 Content

The regulations state that *“Candidates will be expected to demonstrate in their dissertation an appreciation of the role of methods studied in the course.”*

Such a *demonstration of appreciation* can take different forms; it might consist in an application of the method, or an extension to the theory. Examples include:

- a specification produced using a language taught in one of the specification-oriented courses;
- a result about inductive arguments for data refinement;
- a technique for conducting hazard analysis using a process algebra.

Each of these involves a single method. Most application-oriented projects will involve more than one method: if the project requires developing a piece of software, then the resulting dissertation could demonstrate understanding of methods taught on a variety of courses.

In some cases, it may be possible to see the project work in terms of a clearly-defined problem and an original solution. In others, key problems emerge only during the project itself, and the value of the work lies in its contribution to understanding.

You should ensure that you allocate a substantial part of your time to writing the dissertation; unless you are a practised writer of technical prose, then plan to take around a month for this. Some dissertations show signs of having been spoilt by a last-minute rush. The dissertation should be a technical document designed to be readable by a person who is neither the candidate nor the supervisor, nor a research expert in the precise subject area.

The Department’s Library contains many previous dissertations. You can also find these on the MSc Thesis Repository database at www.cs.ox.ac.uk/msctheses

You should look at some of these, in consultation with your supervisor, to get an idea of the appropriate length and style. Your supervisor will normally be happy to comment on a draft of your dissertation, but take care to allow time for this: some supervisors are likely to be away in the period leading up to the submission deadline. It is also possible for the work reported on to be a part of a piece of work undertaken by several people, but the contribution of the individual project must be clearly identifiable, and clearly explained in the report. The report must be the work of the candidate alone (except for any clearly identified common material in joint projects).

8.4.4 Length and effort

The regulations state:

“Candidates shall submit a dissertation of not more than 30,000 words, plus not more than 30 pages of diagrams, tables, listing, etc., on a subject selected by the candidate in consultation with the supervisor and approved by the director of the course.”

There is no minimum length. However, it would be unusual to see a document of less than, say, 35 pages in a font size no smaller than 11pt that contained an adequate demonstration of understanding and appreciation.

Although it is difficult to measure such quantities, the effort required for the project and dissertation should be roughly equivalent to that required for five subject courses, with the associated practical work and assignments/written examinations.

The dissertation should have a definite structure: a beginning, a middle and an end. In particular, there should be a final paragraph or two bringing all the material together. However, take care that the introduction, project description and conclusion are not merely repetitions of the same paragraph cast into the future, present and past tenses respectively. You might well include in the report a section on what was learnt from doing the project: this could perhaps include a technical discussion of approaches that were tried and did not work. The conclusions should be reasonably general, so that they could be relevant and useful for people embarking on similar projects, or perhaps a continuation of this one. An analysis of your personal development from doing this project is also appropriate.

8.5 Writing Skills

In Hilary Term or Trinity Term, there will be a session on presentation skills which will cover both writing skills and verbal presentations. All students are expected to attend as this will provide you with useful background for your dissertation.

Overseas students whose first language is not English are encouraged to investigate attending one of the courses on English for Academic Study given in the University Language Centre.

See <http://www.lang.ox.ac.uk/>

If you think this would be suitable for you, please discuss it with your supervisor or the Academic Administrator.

8.6 Proof Reading

As outlined in the Examination Regulations

(www.admin.ox.ac.uk/examregs/2018-19/grgoveresedegr):

“Work submitted for examination must be solely the work of the candidate, except where otherwise clearly indicated. It is not permitted for a student to ask or allow someone else to make material changes to their work, for example, by rewriting passages of text or rewriting formulae or code. Failure to adhere to these regulations could constitute a breach of academic integrity and contravene the Proctors’ Disciplinary Regulations for Candidates in Examination.

Candidates are responsible for the proof-reading of their work. Proof-reading by a third party is acceptable provided it constitutes no more than advice on the following: spelling and punctuation, formatting, grammar and syntax. A third party may not be used to change the text of the thesis so as to clarify, develop or change the ideas and arguments, reduce the length of the thesis, provide help with referencing, correct information within the thesis, or translate the thesis into English.”

For further details on the policy, including what a third party proof-reader may and may not do, please visit <https://academic.admin.ox.ac.uk/policies/third-party-proof-readers>

8.7 Submission of the project dissertation

Submission of the dissertation is through the online submissions portal on the Computer Science WebLearn site. An electronic copy of the dissertation (saved as PDF) and, where applicable, associated source code, must be uploaded to the Assignments section of the Computer Science WebLearn site by **12 noon, Tuesday 1 September 2020**.

The dissertation must be submitted no later than that detailed above, unless Proctoral permission has been received. Work may be submitted in advance of the deadline if you choose. In doing this you will also avoid any issues that may arise due to IT problems and lead to late submission.

As mentioned above, any code generated as part of the project must be submitted alongside the dissertation. All formats are acceptable for the source code.

We recommend that you take time to ensure you are fully familiar with the procedures given on the submissions portal, well in advance of the submission deadline. While the Course Administrator will be available to answer questions, it is not intended that a step-by-step guide be provided, as this would be unfair to other students who wish to make contact.

The department will provide training on how to upload a dissertation to the submissions portal.

Please note the following:

- It is the student's responsibility to ensure that their work is submitted by the deadline.
- Failure to submit an assignment on time as a result of IT problems (eg computer malfunction, slow internet connection) will not be accepted as a valid reason for late submission. You should make regular back-up copies of all work and ensure that there is adequate time to submit your work. Do not leave submission until just before the deadline.
- Responsibility for the work rests with the student at all times until issue of receipt, regardless of the method submission.
- All work will be dealt with under the standard submission procedure, whether submitted early, near the deadline, or late.
- Once submission has been made, the assignment cannot be withdrawn or altered.

You will be informed when the assignment submission area on the Computer Science Examinations portal is open.

8.8 Satisfying the Examiners

The regulations state that the examiners must be satisfied that the candidate has attained an adequate level of achievement in the dissertation:

To satisfy the examiners for the degree of MSc in Computer Science, a candidate must attain an average of at least 50 (pass) on a selection of their best six courses, including at most two courses from Schedule A and at least two courses from Schedule C, pass in the dissertation, pursue an adequate course of practical work and achieve an overall pass in practicals, and unless dispensed under cl.3 (iii) above satisfy the examiners in the viva voce examination.

The decision of the examiners will be based upon two things: the standard set in previous examinations, and the stated aims of the MSc in Computer Science.

Students are encouraged to examine previous dissertations, available in the library, but are reminded that many of these will be of a higher standard than would be expected of dissertations at the pass/fail borderline. A document which is particularly relevant notes that:

Each project will be read by at least one examiner, and an assessor on behalf of the examiners. Both readers will be asked to supply a brief paragraph describing the scope and achievement of the project, and will be asked to give a grade.

8.9 Regulation of Assessment: Final Examination

The Board of Examiners meets every term to consider marks for assignments, and again at the end of the year to consider the overall award. Its five members are appointed by the Divisional Board; each serves a three year term where possible. An External Examiner is appointed who attends the final meeting and provides a separate report to the University.

The Examiners are formally independent from the Department and from those who lecture the courses, but they may, and almost always do, appoint Assessors to assist in the setting and marking to ensure that the examination is closely tied to the taught material.

Assignments and practical reports (anonymous) are marked by an appointed Assessor (usually the lecturer). The assessments are then moderated by the Examiners.

Each dissertation is marked at least twice, once by an appointed Assessor and again by one of the Examiners. The two markers' reports are then considered by the full Board of Examiners.

The decision of the examiners may be contingent upon the results of a viva voce (oral) examination. All candidates are required to attend such an examination unless individually dispensed. In cases where there is any doubt as to a candidate's ability or the originality of their work, this part of the examination process is particularly important.

To be awarded an MSc, a candidate must attain an average of at least 50 (pass) or above on a selection of their best six courses, and pass the associated practical reports. They must also achieve a pass or above for their dissertation.

A distinction is awarded where the candidate has achieved an excellent performance in both the taught part of the course and the dissertation. To obtain a distinction, a candidate must achieve an average of at least 70 on a selection of their best six courses and a USM of at least 70 in their dissertation. A candidate who does not achieve a distinction, but achieves an average USM of at least 65 in their best six courses, and a USM of at least 65 in their dissertation, may be awarded a merit.

National guidance requires external examiners to report on three major areas related to standards:

- whether or not an institution is maintaining the threshold academic standards set for its awards in accordance with the frameworks for higher education qualifications and applicable subject benchmark statements;
- whether or not the assessment process measures student achievement rigorously and fairly against the intended outcomes of the programme(s) and is conducted in line with the institution's policies and regulations;
- whether or not the academic standards and the achievements of students are comparable with those in other UK higher education institutions of which the external examiners have experience.

It also requires informative comment and recommendations on:

- good practice and innovation relating to learning, teaching and assessment observed by the external examiners;
- opportunities to enhance the quality of learning opportunities provided to students.

The report is addressed to the Vice-Chancellor, and will be considered by the relevant divisional board, the faculty/department and by the University's Educational Policy and Standards Committee.

Where an external examiner's report contains particular suggestions or criticisms, it is the responsibility of the faculty/department to ensure that full consideration is given to these, to institute further discussion or action, and to inform the external examiner within a reasonable time of what is done.

The University Proctors have ultimate authority regarding examination conduct and other disciplinary matters.

8.10 Factors in Assessment

The mark awarded to a dissertation will be based upon the examiners' overall impression of the work. To arrive at this impression, they will consider the following factors:

Context: The dissertation should demonstrate, as far as is relevant, a good understanding of the context in which the work was undertaken. It should be evident that the student understood both the problem and the problem domain, and that the choice of approach was informed and intelligent. The examiners would like to be convinced that the student has a good general knowledge of the field.

Competence: The student should demonstrate, in the text of the dissertation that they are able to apply the ideas and the techniques that they have studied. The examiners will look for evidence of understanding, and appropriate application of techniques. They would like to be convinced that the student has shown competence in investigating the chosen topic.

Contribution: The dissertation should have some value in itself. This may arise in different ways: the dissertation may present a fresh application, an extension to a theory, a new solution, or a new approach to a problem. The value will depend upon the extent of achievement: the nature of the application, the utility of the extension, the elegance of the solution, or the coherence of the approach.

All of these are intangible, but the examiners' expectations will be framed in the knowledge that this is work undertaken by new graduates (it should be more advanced than a third-year undergraduate project, but not necessarily comparable with that of a research student). Ideally, the examiners would like to be convinced that the student has made a worthwhile contribution to knowledge or understanding in the field.

Critical Evaluation: The dissertation should provide appropriate critical assessment of the work that has been done and the process of doing it.

Presentation: If the dissertation is to succeed as a demonstration of knowledge and understanding, and if the examiners are to be convinced of the competence of the student, a certain degree of clarity and organisation is required. Part of the value of the dissertation lies in its accessibility: if it is to make a worthwhile contribution, then it must be readable for another member of the cohort that's taken a similar schedule of courses whilst also maintaining sufficient detail to document the work and support assessments made. For these reasons, and because clarity of exposition may in itself reflect a greater degree of effort and understanding, the examiners would like to be convinced that the dissertation is presented in a lucid and scholarly manner.

8.11 Viva Voce

The examiners have the right to require any student to attend for an oral examination on **Wednesday 30 September 2020**. You will be expected to be available on that day. The oral examination is intended to help candidates whose performance in one or both of the other parts of the examination is questionable or not quite satisfactory. If you are required to attend, you should consult your supervisor on the best method of preparing yourself. Most candidates will be dispensed from attendance.

8.12 Intellectual Property

Please see the University's policy on Intellectual Property rights at <https://researchsupport.admin.ox.ac.uk/innovation/ip>

8.13 Marking Assessments

Each band has an informal interpretation, as described in the Exam Conventions at <https://www.cs.ox.ac.uk/teaching/examconventions/MSCinCS.html>

9 If things go wrong

The most common cause for failure is personal problems. If these begin to affect your health or your work, do not delay in consulting your medical advisor or one of the many supervisors or advisors allocated to you by the Department and your College. Nearly all problems, whether emotional, medical or psychological, can be solved or alleviated by those who have the experience and expertise to advise, *provided that they know early enough*.

Each college has its own systems of support for students: please refer to your College Handbook or website for more information on whom to contact and what support is available through your college.

There is a wide range of sources of support available more widely in the University, including in relation to mental and physical health and disability: details are available from www.ox.ac.uk/students/welfare.

The second most common reason for failure is undertaking outside commitments or employment at any time during the academic year. **Do not do this.** It is incompatible with your status as a student of the University. In cases of exceptional pressure, you should discuss with your supervisor or the Course Director the options of withdrawing or delaying. This would be much better (financially as well) than failing the course and having to retake it.

A third possible reason for disappointment is a mismatch between the culture and content of the course and the experience and aspirations of the student. Every effort is made in course design, provision of options, and the selection of students; but there is no way to avoid the occasional mismatch. This must be regarded as failure of the system rather than the student, and it is sensible to treat the problem without allocating blame. The best solution is to recognise the situation as early as possible, and avoid further waste of effort and disappointment.

9.1 Failure and Resits

The requirements that must be met to obtain the MSc in Computer Science are set out in the Regulations, together with the consequences of failing to meet them.

Any candidate who has not achieved an average of at least 50 in their best four courses taken during Michaelmas and Hilary Term shall be deemed to have failed the degree course and will not be permitted to submit a dissertation.

To satisfy the examiners for the degree of MSc in Computer Science, a candidate must attain an average of at least 50 (pass) on a selection of their best six courses, including at most two from Schedule A and at least two courses from Schedule C, pass in the dissertation, pursue an adequate course of practical work and achieve an overall pass in practicals, and unless dispensed under cl.3 (iii) in the Examination Regulations (www.admin.ox.ac.uk/examregs/2019-20/mosbcincompscie/studentview), satisfy the examiners in the viva voce examination. The examiners may award a distinction for excellence in the whole examination.

A candidate who fails part of the examination, either the dissertation or taught courses, will be permitted to retake that element (or equivalent) on one further occasion only, in the year following the initial attempt.

A candidate who retakes examinations that they have failed in the previous year will be required to pay the relevant fees for exam entry. Such a student may, at the discretion of the Course Director, be exempted from attending lectures, classes, and practicals for the course. However, a student who substitutes a new course for a previously failed course will normally be required to attend the lectures, classes, and practicals, and will be liable for fees in the relevant term(s).

9.2 Difficulties

If you have difficulty in understanding a lecture, please discuss it with your supervisor, or the class tutor for the course; at least one of them should be able to make an explanation that meets your needs. If you find the lectures unsatisfactory in any other way, please tell the lecturer or

your supervisor; they are keen to make improvements where possible. If you find any aspect of your supervision unsatisfactory and you feel unable to discuss it with your supervisor, you should contact one or more of the following members of staff: your Advisor; the MSc Course Director; the MSc Course Administrator; the Academic Administrator or (in exceptional circumstances) the Head of Department.

9.3 Feedback

You will be asked to complete a questionnaire for each lecture course you attend. Please take the time to complete this and return it, as feedback is extremely valuable in helping us to continue to improve the course and your learning experience.

All students will also be invited to complete an end of course questionnaire, the results of which will be considered by the MSc Supervisory Committee in the following academic year.

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:

www.ox.ac.uk/students/life/student-engagement

9.4 Student Representative

You will be asked to nominate a student representative(s) to sit on the MSc Supervisory Committee which meets once a term in week 3. Once confirmed, the names and email addresses of the student representative(s) will be circulated to the Cohort, and an additional reminder will be sent out prior to the Supervisory Committee each term. Please make sure that the representative is aware of any concerns or comments you have regarding the course.

10 Doing a Research Degree at Oxford

Some students undertake the MSc course specifically as initial preparation for doing PhD level research; others discover an interest in doing research during the course. If you wish to be considered for a research place in the Department, you will have to apply following the standard applications procedure. The process and deadlines are documented on the Department's website, and you are encouraged to consult the information provided there.

If you are applying for funding, you must apply by the 10 January deadline. All students who are offered a place are automatically considered for funding.

You will need to include a research proposal or a statement of your research interests and further information on what is required can be found here:

www.cs.ox.ac.uk/admissions/graduate/dphil-computer-science/statement

Of course, it's a good idea to have informal discussions with potential DPhil supervisors in the Department, before proceeding to a formal application. Perhaps you are thinking of a research proposal arising from your MSc project, in which case you should discuss your ideas with your project supervisor. Perhaps you have become interested in the research area of one of your lecturers or another member of the Department; get in touch with them to talk about it. The Director of Graduate Studies or the Graduate Studies Administrator are also happy to talk informally about doing a DPhil.