DEPARTMENT OF
COMPUTER SCIENCE

UNDERGRADUATE
COURSE HANDBOOK

Computer Science
Computer Science & Philosophy
Mathematics & Computer Science

2018

Version 1.1

Welcome

Welcome to Oxford! 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 and students, attracted to Oxford from all over the world. You are here because you want to study Computer Science, and our aim is to give you the best opportunity to study it that we can.

The Department of Computer Science has an international reputation for the strength of its research and teaching, built up over many years. Our current research ranges from exploring the fundamental issues of the meaning of programming languages, to the engineering of large-scale systems and the modelling of biological processes. Many of the people that teach you are involved in cutting-edge research, and this influences and informs the courses we teach, which are continually evolving.

The Department has been generously supported over the years by donations and sponsorship from many industrial partners. When you graduate, we are confident that you will have a sound basis for a productive and rewarding career.

This handbook is intended to guide you through the course, and to give you a handy reference to many of the things that will be unfamiliar about the way we run things here. If you think that the handbook could be improved in some way, or if you find that there is something misleading in it, do let us know.

During your study at Oxford we all hope to share with you some of the understanding we have gained from our own study, research and industrial collaboration. We hope too that you will be able to share with us – and with each other – your enthusiasm for the subject, and your own varied experiences. Above all, we hope that you will enjoy developing your talents in this exciting field.

Alex Rogers
Deputy Head of Department (Education)

Ani Calinescu
Director of Teaching

Mission Statement

Christopher Strachey, the founder of the Programming Research Group at Oxford, wrote:

> *It has long been my personal view that the separation of practical and theoretical work is artificial and injurious. Much of the practical work done in computing, both in software and in hardware design, is unsound and clumsy because the people who do it have not any clear understanding of the fundamental design principles of their work. Most of the abstract mathematical and theoretical work is sterile because it has no point of contact with real computing. One of the central aims of the Programming Research Group as a teaching and research group has been to set up an atmosphere in which this separation cannot happen.*

The specific teaching mission of Department of Computer Science upholds this view. It is:

1. to teach computing as a coherent science, with due emphasis on its mathematical foundations.
2. to teach information technology as an engineering discipline with its over-riding goal of correct and cost-effective design based on rigorous scientific reasoning.
3. to offer a progressive range of options including hardware and software, theory and practice, general technology and illustrative applications.
4. to keep the syllabus in correspondence with the long-term needs of the employers of our graduates.
5. to develop the students' intellectual abilities and personalities to fit them for future leadership of a demanding profession.
6. to conduct research contributing to these goals, and to publish textbooks to help ourselves and others to reach them.

Contents

Disclaimer

This handbook applies to students starting an undergraduate degree in Computer Science, Mathematics & Computer Science or Computer Science & Philosophy in Michaelmas term 2018. 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://www.admin.ox.ac.uk/examregs/2018-19/peincompscie/studentview/

https://www.admin.ox.ac.uk/examregs/2018-19/peimandcompscie/studentview/

https://www.admin.ox.ac.uk/examregs/2017-18/peicscieandphil/studentview/

http://www.admin.ox.ac.uk/examregs/2018-19/hsofcompscie/studentview/

http://www.admin.ox.ac.uk/examregs/2018-19/hsomandcompscie/studentview/

http://www.admin.ox.ac.uk/examregs/2018-19/hsocscieandphil/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 Mrs Leanne Carveth in the Department of Computer Science, leanne.carveth@cs.ox.ac.uk.
The information in this handbook is accurate as at 26th September 2018, however it may be necessary for changes to be made in certain circumstances, as explained at www.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.

Version	Action	Date
Version 1.0	Published start of MT18	07/10/18
Version 1.1	Update on Assessment of Probabilistic Model Checking	11/10/18

1 Sources of information

This handbook is intended to guide you through your course at Oxford. It does not replace the official regulations (like, for example, the Examination Regulations) relating to your degree, but it should be a less formal and more easily understood guide to your course.

The handbook tries to save you time by telling you many of the things which you might discover by experience, or by asking; but it cannot tell you everything. This University is a complex institution, so do not be afraid to ask for information or advice. Your tutor is your first and best guide, so do ask him or her when you need help or advice. Below is a list of other places where you will find useful information regarding your degree.

1.1 Examination regulations

The *Examination Regulations*, (historically known as the "Grey Book"), is the authoritative document on University examinations. The *Examination Regulations* define the format for examinations, and changes to them are strictly regulated by the University to ensure that you cannot be disadvantaged by any changes which are made after you start your course. *The Examination Regulations* are available online.

1.2 Department of Computer Science Website

This is one of the most important sources of information for your degree. The website has details of all course synopses and syllabuses which form part of this handbook, timetables, information about projects and past exam papers and examination.

You can access the Department's intranet from the departmental website, here:

https://intranet.cs.ox.ac.uk/home2/

It provides you with a host of practical information. If you need to contact the Department's IT Support, or have questions about Health and Safety, or need to find an internal telephone number, that's the place to go.

1.3 University Student Handbook

Each year you will receive the latest version of the *University Student Handbook*. It forms part of your contract with the University. It is available online.

1.4 Oxford Students website

This website offers a host of information and is well worth exploring!

Your college will probably also have detailed guidance about its own regulations and requirements. Your tutor and your college office will be able to point you in the right direction.

2 Finding your way around

Your academic life in Oxford will involve two intimately connected but distinct institutions. You are a member both of a college and of the University; the teaching of your degree course involves both your tutor in college, and lectures, classes, and practicals in the Department of Computer Science, which is part of the University.

The University and its departments enable you to study for a degree, examine your competence at the end of that study, and award you a degree. Your College provides you with a home, feeds you, guides your study and organises some of your teaching. Admitting undergraduates to Oxford, and their academic and personal well-being, are principally the concerns of the colleges. Traditionally, most of the teaching was organised by and between the colleges; however, in science subjects in particular, the central provision of expensive equipment has led to an increased role for departments like the Department of Computer Science.

2.1 Academic Staff

The academic staff you will encounter are likely to be in three kinds of job. There are college tutors and college lecturers who are employed by your college to teach you and guide your study here; there are University Lecturers and other university staff who are employed to give lectures, to organise the degree courses and to examine; and there are departmental staff who are employed to run practical work and organise laboratory work and classes. However, most of the academic staff that you meet will be in at least two of these categories; thus you may well encounter the same person as your tutor in College, as a lecturer in the Department of Computer Science, and perhaps as an examiner when it comes to your University Examinations.

2.2 Support Staff

The Academic Administration team at the Department of Computer Science are responsible for supporting all aspects of teaching and examinations and work closely with the academic staff to do this. You will receive communications from them throughout the year, usually with regard to lectures, classes, practicals, examinations and projects. Please ensure that you read these emails and memos and respond where necessary. They are also available should you need assistance, and so if you think they can help you please contact them by email.

Academic Admin Team:
Leanne Carveth – Academic Administrator, Disability co-ordinator and Harassment Officer
leanne.carveth@cs.ox.ac.uk Room 114

Kathrin Gowers – Deputy Academic Administrator
leanne.carveth@cs.ox.ac.uk Room 114

Jo Ponting – Academic Administrative Officer
jo.ponting@cs.ox.ac.uk Room 114

Brenda Deeley – Staff Secretary
brenda.deeley@cs.ox.ac.uk Room 106

Sarah Retz (on maternity leave), Tim Jones (maternity cover) – MSc Course Administrator
tim.jones@cs.ox.ac.uk Room 112

Julie Sheppard – Graduate Studies Administrator
julie.sheppard@cs.ox.ac.uk Room 112

Suzanna Marsh – Communication and Schools Liaison Manager
suzanna.marsh@cs.ox.ac.uk Room 116

Dr Rosanna Cretney - Outreach and Schools Liaison Coordinator
rosanna.cretney@cs.ox.ac.uk Room 116

2.3 The Department of Computer Science

The Department of Computer Science runs a network of computers and other facilities devoted to teaching requirements, and administers lectures, practicals, projects and some University-wide classes. Our buildings house lecture theatres and seminar rooms in which most of the university lectures in Computer Science take place.

The head of the Department of Computer Science in 2018/19 is Prof. Pete Jeavons. For more information on who is doing what in the Department, you can consult the list of Academic Duties.

2.3.1 The Wolfson building

The main building of the Department of Computer Science is the Wolfson Building which stands at the south-eastern corner of what is known as the Keble Road Triangle consisting of Keble Road, Banbury Road and Parks Road. All rooms on the basement floor are numbered with a number beginning with 0-, rooms on the ground floor (Level 1) with a number beginning with 1-, rooms on the first floor (including the Library) with a number beginning with 2-, and so on.

The reception desk is at the main entrance, which is on Parks Road. The Wolfson Building opens at 08:30 and the doors are locked at 17:15 Monday to Friday.

Lecture Theatre A is on the basement floor and Lecture Theatre B is on the ground floor: they can be reached through the door to the right of the main Parks Road entrance, as can the seminar room 051 and the Undergraduate Social Area (room 048). There is a small kitchen in the basement which can be used to make hot drinks. Please do not to take food or drinks other than water into lecture rooms, seminar rooms, computer rooms, or laboratories.

2.3.2 The Robert Hooke building

The department has three seminar rooms in the Robert Hooke building, the Richard Bird Room, the Tony Hoare Room and Room 114. These rooms will be used for classes and from time to time may be used for small lecture courses. The building is located on Parks Road, to the north of the University Museum. The building can be accessed using your University card.

2.3.3 Computing resources

The department's teaching network (used by undergraduates and sometimes by MSc course students) comprises 48 PCs running Linux. They are located in the Practicals Laboratory (T6.09) on level 6 of the Thom Building. You will be asked to complete an application form at the start of your course to use these computing facilities.

You may have some prior knowledge of using computers; however you may not have specific experience with the type of systems available at Oxford. Therefore, at the start of the first year, there are introductory sessions, designed to help you become more familiar with the systems and give you an opportunity to use the network and ask questions. Demonstrators are present at these sessions, giving you a chance to meet them and find out more about practicals.

Those courses which have practical work associated with them are supported by practical sessions in the Practicals Laboratory throughout the term. These sessions guarantee students exclusive access to the computing facilities they require to complete their work. Demonstrators are present at each session so that you can obtain help with the practicals as you are doing the work.

Although the computers are often booked for practical sessions, there are times when these computers are available for students to use. This is mainly to facilitate work on projects. Many students also find it useful to be able to do further work on their practicals outside the normal practical times, or to take the opportunity to learn more about the facilities available.

2.3.4 Personal computers

You do not need your own computer. The Department's computing facilities are all you will need during your undergraduate career. However, many undergraduates have their own computer. The practical work associated with some courses is flexible enough to enable you to do the work on your own computer provided it is set up with appropriate software.

Your college IT officer will be able to advise you on remote access to the Department's facilities from your own computer, or from the college's own computers. There are 10 Linux PCs in the Department available for access at all times through the University network.

Please note that you will not be allowed to plug in to the wired ethernet in the Practicals Laboratory in the Thom Lab or in the Department. Wireless connection is available in these areas.

2.3.5 Communication and electronic mail

Oxford University IT Services automatically provide email facilities for all new undergraduates, at the same time as you are given a University Card. You will also register with the Department of Computer Science to use departmental computers for your course, and can use these accounts to send and receive e-mail.

E-mail is, generally speaking, a good way of contacting members of the Department of Computer Science and most of the other academic staff you will need to reach. You will be expected to know how to use it and to check your e-mail frequently.

2.3.6 Access to course material pages from outside ox.ac.uk

There is a lot of course material on the department web pages. This can be accessed from outside the Oxford domain, though it is password-protected.

If you try to access these pages from outside ox.ac.uk you will reach a page saying: 'Teaching material pages are only accessible to registered students and staff of Oxford University connecting from a host in the ox.ac.uk domain'.

Please use your Single-Sign on username and password to access this material.

This material is made available for your use only (the copyright belongs to the authors). You should not pass it on to anyone else.

2.4 Other Departments

2.4.1 The Mathematical Institute

The Mathematical Institute organises the degrees in Mathematics and joint degrees including those with Computer Science. The Mathematical Institute is housed in the Radcliffe Observatory Quarter on Woodstock Road.

2.4.2 The Department of Engineering Science

The Department of Engineering Science organises the University's Engineering degrees. The departmental building also houses our undergraduate Practicals Laboratory in the Thom Building. This building is the glass and concrete tower which dominates the Keble Road triangle and its entrance is from the elevated walkway. The Practicals Laboratory is on level 6 of the Thom Building, and there are lecture rooms on levels 1 and 8.

2.4.3 The Faculty of Philosophy

The Faculty of Philosophy is part of the Humanities Division and organises the University's degrees in Philosophy. The Faculty of Philosophy is housed in the Radcliffe Observatory Quarter on Woodstock Road and this is where lectures in Philosophy for the joint degree will take place.

2.4.4 Oxford University Language Centre

The Language Centre provides courses and other resources to help you learn modern foreign languages, or to keep up and develop your skills. It is situated on Woodstock Road just north of St Giles church, and at the back of the IT Services building.

2.4.5 The Examination Schools

The Examination Schools is the department of the University that administers public examinations. It is housed in a building on the south side of High Street, east of University College. This building is likely to be the location of your final examinations. When not in use for examinations the rooms and halls of the Examination Schools are used for lectures in subjects which do not have their own lecture theatres, and for special lectures which draw large audiences.

There is a second examination hall in Ewert House in Summertown which will probably be used for your first year examination, known as "Preliminary Examinations", or "Prelims". You will be told where your examinations are to be held nearer the time. Timetables are published on the University's Timetables site.

2.5 Libraries

Your principal source for books and journals should be your college library. Your college librarian will tell you what it provides, and your college tutor will try to ensure that it provides the textbooks which are of most use for the course.

The main university library is the Bodleian Library and its science department is the Radcliffe Science Library. The Radcliffe Science Library is on Parks Road, between the University Museum and South Parks Road. This provides multiple copies of undergraduate text books on science reading lists and may be able to provide books which your college library does not have. The Mathematical Institute houses the Whitehead Library, for all things mathematical.

The Department of Computer Science Library contains books, monographic series, journals, technical reports and past theses covering the main research interests of the Department. It is principally for use by graduate students and staff, and is situated in room 240 on Level 2 of the building.

Opening hours: The library is open 24/7. Library staff are normally available from 09:00-13.00 and 14.00-16.30 Monday to Friday**.**

Registration: you will be pre-registered but you must confirm your registration by bringing your University Card to the library before you begin to borrow.

The Catalogue: books and journals are listed on SOLO (the University-wide online catalogue).

Borrowing: members are limited to 12 books at any one time. Books may be borrowed for 3 weeks at a time with possibility of renewal for a further three periods of three weeks unless a book has been recalled by another reader. Books are borrowed using the automated self-issue system. Please ask if you have problems using the machine.

Short-loan Collection: books in the short loan collection may be borrowed for 6 days with possibility of renewal for a further six periods of 6 days. They are kept in locked bookcases and can only be borrowed when the library is manned or by email request.

Other services: The library has a compact study area with a dedicated terminal for SOLO catalogue searches and a computer for general internet searches. The library also contains copies of the MSc and D.Phil. theses submitted by students attached to the Department.

Contact the Library: Michael Neville (Librarian), Aza Ballard-Whyte (Library Assistant), telephone 73837, email library@cs.ox.ac.uk.

Finding resources: see www.bodleian.ox.ac.uk/finding-resources

3 Courses

3.1 Computer Science

The Department of Computer Science offers the following courses in Computer Science at undergraduate level:

BA – Computer Science, 3-year
MCompSci – Computer Science, 4-year

You will initially be entered for the 4-year degree, and will need to decide by early in your third year whether you wish to carry on into the fourth year or leave at the end of the third year with a BA.

Please note that the Computer Science courses in Part C are 50% bigger than those in earlier years, i.e. for each course in the 3rd year undergraduates are expected to undertake about 10 hours of study per week, but 4th year courses will each require about 15 hours a week of study. Computer Science lecturers are providing this extra work in a variety of ways, e.g. some will give 16 lectures but will require you to undertake extra reading, classes and/or practicals, whereas others will be giving 24 lectures, and others still will be doing something in between. Please look at each synopsis for details on this.

Course Aims

- To provide a course of the highest academic quality in Computer Science in a challenging and supportive learning environment that attracts the very best students from the UK and elsewhere.

- To provide students with a broad, balanced knowledge of core areas and advanced topics in Computer Science, as defined by the QAA Benchmark Statement issued in 2007.

- To develop in students the ability to evaluate primary evidence critically and the conceptual understanding to marshal and present arguments and solutions based on primary data, relevant theory and the application of sound reasoning.

- To develop transferable skills relating to problem solving and spoken and written communication.

- To bring students to a position on graduation where they can choose confidently from a wide range of careers, both within the Information Technology sector and outside it.

Intended Learning Outcomes

Students will develop a knowledge and understanding of:

- the general theoretical and practical principles of Computer Science.
- a broad range of topics in theoretical Computer Science and the architecture and implementation of information systems.
- relevant mathematical theories and techniques and their application to practical design problems.
- methods of software development.

The course is in line with the criteria set out in the QAA benchmark statement for Computing, 2016. That benchmark statement recognizes the need for diversity of provision in Computing, and the Oxford course remains firmly established at the theoretical end of the spectrum of degree courses. Topics from the body of knowledge outlined in the benchmark statement are covered as follows in the course:

First year

In the first year of the Computer Science degree, you will take ten lecture courses - nine taught in the Department of Computer Science and one taught in conjunction with Mathematics (with lectures organised by the Mathematical Institute).

Computer Science

- Functional Programming
- Design & Analysis of Algorithms
- Imperative Programming Parts 1 and 2
- Imperative Programming Part 3
- Discrete Mathematics
- Linear Algebra
- Digital Systems
- Continuous Mathematics
- Introduction to Formal Proof

Mathematics

- Probability

Second and third years

Synopses for all courses can be found at www.cs.ox.ac.uk/teaching/courses/

Second-year Computer Science candidates will take four core courses:

- Compilers
- Concurrent Programming
- Algorithms
- Models of Computation

Concurrent Programming, Algorithms and Models of Computation will each be examined by a 2 hour written examination.

Compilers will be examined by an assessed practical (35% of the marks) and a 2 hour written examination (65%).

Instructions for the assessed practical will be handed out on Friday in week 8 of Michaelmas term, and the practical report must be handed in to the Examination Schools, High St., Oxford by noon on Friday of week 2 of Hilary term. The assessed practical will incorporate and extend elements of the lab exercises that were set during term. As always, the work you submit must be your own, except where explicitly acknowledged.

Appendix A of the Course Handbook sets out the standards that are expected in this regard. Please see also the University's guidelines for academic good practice.

In the second and third years you are required to take a total of 10 optional courses from Schedules S1 and S2 (with no more than two from Schedule S2). It is recommended that you take four or five of these in your second year. These lists can be found at

www.cs.ox.ac.uk/teaching/bacompsci/PartA/

The four core courses will be examined at the end of the second year and the 10 optional courses will be examined at the end of the third year. It is strongly recommended that if you intend to study any Computer Science optional course that is scheduled in Trinity term, you do so in your second year, as they may clash with examinations if studied in your third year.

The examination papers will have three questions, and you may attempt two of them. In finals papers, questions are marked out of 25. The marks for each part of each question will be indicated on the examination paper.

In the third year you are also required to submit a project report.

You will have the option of continuing for a fourth year, if you have achieved at least upper second class Honours (2.1) in the second and third years together.

In the fourth year of Computer Science you are required to take five courses and a Computer Science project. The courses are chosen from a schedule called C1, which is published at http://www.cs.ox.ac.uk/teaching/bacompsci/PartC/

3.2 Mathematics & Computer Science

The department offers a joint degree with the Department of Mathematics leading either to a BA degree after three years, or to a Masters degree after four years:

BA – Mathematics and Computer Science, 3-year
MMathCompSci – Mathematics and Computer Science, 4-year

You will initially be entered for the 4-year degree, and will need to decide by early in your third year whether you wish to carry on into the fourth year or leave at the end of the third year with a BA.

Course Aims

- To provide a course of the highest academic quality in Mathematics and Computer Science in a challenging and supportive learning environment that attracts the very best students from the UK and elsewhere.

- To provide students with a broad, balanced knowledge of the two subjects of Mathematics and Computer Science, as defined by the relevant QAA Benchmark Statements.

- To develop in students the ability to evaluate primary evidence critically, and the conceptual understanding to marshal and present arguments and solutions based on primary data, relevant theory and the application of sound reasoning.

- To develop transferable skills relating to problem solving and spoken and written communication.

- To bring students to a position on graduation where they can choose confidently from a wide range of careers, both within the Information Technology sector and outside it.

Intended Learning Outcomes

Students will develop a knowledge and understanding of:

- core areas of Mathematics, including the principal areas of Mathematics needed in applications.

- the general theoretical and practical principles of Computer Science.

- the basic ideas of mathematical modelling, particularly as applied to design problems in Computer Science.

- a broad range of topics in theoretical Computer Science and the architecture and implementation of information systems.

- the basic ideas of a variety of areas of specialisation in Pure and Applied Mathematics and in Computer Science.

The course combines elements from the programmes in Mathematical Sciences and in Computer Science, each of which is in line with the criteria set out in the respective QAA benchmark statements.

First year

In the first year of the Mathematics & Computer Science degree, you will take 11 lecture courses; five in Computer Science and six taught in conjunction with Mathematics (with lectures organised by the Mathematical Institute)

Computer Science

- Functional Programming
- Design & Analysis of Algorithms
- Imperative Programming Parts 1 and 2
- Imperative Programming Part 3
- Continuous Mathematics

Mathematics

- Introduction to University Mathematics
- Introduction to Complex Numbers
- Linear Algebra I and Linear Algebra II
- Analysis I – Sequences and Series and Analysis II – Continuity and Differentiability
- Probability
- Groups and Group Actions

Synopses for Computer Science courses can be found at www.cs.ox.ac.uk/teaching/courses/

Details on Mathematics courses can be found at www.maths.ox.ac.uk/courses

Second and Third year

Second year Mathematics and Computer Science students take the following Maths papers:

- A0 Linear Algebra

- A2 Metric Spaces and Complex Analysis

In addition, you must offer either two papers from papers A3-A5, A7-A11 or one paper from A3-A5, A7-A11 and paper ASO

- A3 Rings and Modules
- A4 Integration
- A5 Topology
- A7 Numerical Analysis
- A8 Probability
- A9 Statistics
- A10 Fluids and Waves
- A11 Quantum Theory
- ASO Short Options

You must also take two core Computer Science courses: Models of Computation, and Algorithms. These courses will be examined at the end of the second year.

It is particularly important to choose courses in your second year that will lead on to the options that you wish to take in the third year, especially if you want to spend more than half of your time on Maths courses in the third year. You should consult your college tutor for advice about this.

It is strongly recommended that if you intend to study any Computer Science optional course that is scheduled in Trinity term that you do so in your second year as they may clash with examinations if studied in your third year

In your third year, you must choose at least two **Part B** options from Schedule S2 for **Maths**.

For **Computer Science**, for **Part B** of your examination at the end of your third year, you will take at least four courses from Schedule S1 across your second and third years. You should aim at taking at least two of the four courses in your second year.

You must offer ten optional courses in total for your Part B examination. Apart from the minimum requirements listed above, you may fill your remaining four option courses from schedules S1 and S2 in any way you like. This is equivalent to 32 lectures

Information about Part A courses can be found at http://www.cs.ox.ac.uk/teaching/mcs/PartA/ and Part B courses at http://www.cs.ox.ac.uk/teaching/mcs/PartB2018-19/

Synopses for Computer Science Courses can be found at www.cs.ox.ac.uk/teaching/courses/

Synopses for Mathematics Courses can be found at www.maths.ox.ac.uk/courses

In the **fourth year** of Mathematics and Computer Science you are required to take either five courses and a Computer Science project *or* six courses and a Mathematics dissertation. The courses are chosen from Schedule C1 and Schedule, C2. There is no restriction on the number of courses chosen from each schedule. The schedules are

published at http://www.cs.ox.ac.uk/teaching/mcs/PartC/. Note that if you choose to submit a Mathematics dissertation, you must also choose at least two other Mathematics courses.

Details on Mathematics courses currently offered to fourth year students can be found at https://courses.maths.ox.ac.uk/year/2018-2019

3.3 Computer Science and Philosophy

The department offers a joint degree with the Faculty of Philosophy leading either to a BA degree after three years, or to a Masters degree after four years:

- BA – Computer Science and Philosophy, 3-year
- MCompPhil. – Computer Science and Philosophy, 4-year

You are initially entered for the 4-year degree, and need to decide by early in your third year whether you wish to carry on into the fourth year or leave at the end of the third year with a BA.

Course Aims

Students will develop a knowledge and understanding of:

- To provide a course of the highest academic quality in Computer Science and Philosophy in a challenging and supportive learning environment that attracts the very best students from the UK and elsewhere.

- To provide students with a broad, balanced knowledge of core areas and advanced topics in Computer Science, as defined by the QAA Benchmark Statement, including logic as a natural bridge with Philosophy.

- To enable students to appreciate the interest and importance of philosophical questions on a variety of topics, including links with Computer Science, and to contribute to the discussions of these questions.

- To enhance the understanding of both Computer Science and Philosophy by parallel study of these related disciplines with particular emphasis on the interdisciplinary subjects of logic and philosophy of science.

- To develop in students the ability to evaluate primary evidence critically and the conceptual understanding to marshal and present arguments and solutions based on primary data, relevant theory and the application of sound reasoning.

- To provide a learning environment which draws on the wide-ranging talents and expertise of staff in both Computer Science and Philosophy, and challenges and

encourages students, with their differing needs, interests and aspirations, to reach the full potential, personally and academically.

- To develop transferable skills relating to problem solving, as well as promoting the ability to think independently, to develop powers of critical analysis, of sustained argumentation and of clear and effective communication both orally and in writing.

- To bring students to a position on graduation where they can choose confidently from a wide range of careers, both within the Information Technology sector and outside it.

And for students taking the 4-year MCompPhil

- To provide the foundations for graduate study at a leading university, in the UK or abroad, in either Computer Science or Philosophy.

Intended Learning Outcomes

- the general theoretical and practical principles of Computer Science;

- a broad range of topics in theoretical Computer Science and the architecture and implementation of information systems;

- relevant mathematical theories and techniques and their application to practical design problems;
- methods of software development;

- selected philosophical texts and central philosophical issues and the concepts needed to discuss those texts and issues in and effective manner;

- the elements of mathematical logic and philosophy of science.

First year
In the first year of the Computer Science and Philosophy degree you will take ten courses - five in Computer Science, four taught in Philosophy and one taught in conjunction with Mathematics (with lectures organised by the Mathematical Institute).

Computer Science

- Functional Programming
- Discrete Mathematics
- Design & Analysis of Algorithms
- Imperative Programming Parts 1 and 2
- Imperative Programming Part 3

Philosophy

- General Philosophy
- Introduction to Logic
- Elements of Deductive Logic
- Turing on Computability and Intelligence

Mathematics

Probability

Synopses for computer science courses can be found at www.cs.ox.ac.uk/teaching/courses/

Details of Philosophy courses can be found at
www.philosophy.ox.ac.uk/course-descriptions-first-public-examination-fpe#collapse390526

Second and Third Year

Summary:

Apart from two Computer Science Part A core courses, you have to take an equivalent of 14 option "course-equivalents", with at least four from Computer Science, and at least six from Philosophy. The remaining four may be chosen from either discipline without restriction. Each Philosophy option is worth two "course-equivalents" and each Computer Science option is worth one. The possible combinations are:

- Four Computer Science options and five Philosophy options
- Six Computer Science options and four Philosophy options
- Eight Computer Science options and three Philosophy options

Computer Science

In the second year of the degree you are required to take the core Computer Science subjects:

- Algorithms
- Models of Computation

These subjects will be examined at the end of the second year, in your **Part A** examination.

You should also take four, six or eight Computer Science courses, during the second and third years, from Schedule S1(CS&P) It is recommended that you take at least two of these courses during your second year. These options will be examined in your **Part B** examination at the end of your third year.

It is strongly recommended that if you intend to study any Computer Science optional course that is scheduled in Trinity term that you do so in your second year as they may clash with examinations if studied in your third year.

Philosophy

You will take three, four or five Philosophy courses during the second and third years, from the following list of courses. It is recommended that you take two courses in your second year. Two of these courses must be chosen from Papers 101, 102, 103, 104, 108, 122, 124, 125 and 127.

The subject list for Philosophy is:

101. Early Modern Philosophy; 102. Knowledge and Reality; 103. Ethics; 104. Philosophy of Mind; 106. Philosophy of Science and Social Science; 107. Philosophy of Religion; 108. The Philosophy of Logic and Language; 109. Aesthetics; 110. Medieval Philosophy:Aquinas; 111. Medieval Philosophy: Duns Scotus and Ockham; 112. The Philosophy of Kant; 113. Post-Kantian Philosophy; 114. Theory of Politics; 115. Plato, Republic; 116. Aristotle, Nicomachean Ethics; 117. Frege, Russell, and Wittgenstein; 118. The Later Philosophy of Wittgenstein; 120. Intermediate Philosophy of Physics; 122. Philosophy of Mathematics; 124. Philosophy of Science; 125. Philosophy of Cognitive Science; 127 Philosophical Logic; 128. Practical Ethics.

You can find details of these courses on the Philosophy Faculty Website.

Note that each Philosophy option is twice the weight of a Computer Science option.

Fourth Year

You will have the option of continuing for a fourth year, if you have achieved at least upper second class Honours (2.1) in the second and third years together.

In the fourth year of Computer Science and Philosophy, you may take courses according to the following rules:

- Each Philosophy paper or thesis is worth 8 units;
- Each Computer Science taught course is worth 3 units;
- A Computer Science project is worth 9 units.

You must complete between 24 and 26 units, subject to the following constraints:

- You may take at most six Computer Science taught courses;
- You may not take both a Philosophy thesis and a Computer Science project.

Computer Science courses are chosen from Schedule C1. Philosophy courses are chosen from courses 101-120, 122, 124, 125, 127 and 180, as described on the Philosophy Faculty Website. Each Philosophy course will be assessed by a 3-hour written examination together with an essay of at most 5,000 words.

Rules for Philosophy theses are described in the Examination Regulations except that the word limit is 20,000 words. More advice on Philosophy essays and theses will be issued later in the year.

The effect of these rules is that you should take one of the following combinations:

- Three Philosophy papers (maybe including a thesis) (24 units);
- Two Philosophy papers (maybe including a thesis) and either three CS courses or a CS project (25 units);
- One Philosophy paper (or thesis), and six CS courses (26 units);
- One Philosophy paper, three CS courses and a CS project (26 units);
- Five CS courses and a CS project (24 units).

Full listings of Philosophy courses available to Computer Science and Philosophy students can be found at http://www.cs.ox.ac.uk/teaching/csp/.

Guidance on Fourth Year Philosophy theses

Computer Science & Philosophy candidates may offer a Philosophy thesis in Part C. **The deadline for seeking approval of your proposed topic for a Philosophy thesis is Friday of Week 4 of the Michaelmas term preceding the examination**. The application for approval of topic is submitted to the Director of Undergraduate Studies, Faculty of Philosophy, c/o the Undergraduate Studies Administrator at Radcliffe Humanities, and should consist of your proposed title and an explanation of the subject in about 100 words and a letter of approval from your tutor. You can also seek approval earlier and it's a good idea to do so before you put in a lot of work. If possible, begin thinking about a thesis topic during the Easter Vacation of the preceding year, and have a talk with a tutor during that Trinity term. If the tutor thinks that the subject is manageable, get some initial suggestions for reading and follow them up. Remember that tutors can only advise: the decision to offer a thesis is your own, and so is the choice of topic. So of course is the work; what makes a thesis worthwhile is that it is your own independent production. Don't worry if the outline of your topic in an early application is not in the end very closely adhered to: the point of it is to make clear the general subject of the thesis and to show that you have some idea how to go about tackling it. If later you wish to alter the title of your thesis, that should not be a difficulty, but you must apply in the same way for permission to do so. (This is so that the Chairman of Examiners knows what to expect.)

The Regulations state that you may discuss with your tutor the field of study, the sources available, and the method of presentation. Before you start work, go over the plan of the whole thesis very carefully with your tutor. The plan must be yours, but the tutor can help you make sure that the plan is clear, coherent and feasible. Get more advice on reading. But bear in mind that much of your reading will be discovered by yourself, so arrange to be in Oxford, or near a large library, for some weeks of the vacation. Don't let your topic expand or your reading range too widely; 20,000 words is the length of two articles, not a book. Your tutor may also read and comment on drafts, subject to the constraint that the amount of assistance the tutor

may give is equivalent to the teaching of a normal paper, so tutorial sessions can be used for trying out drafts of parts of the thesis. However, you have to write the finished version on your own: make sure you allow plenty of time: almost certainly more time will be needed than you first expected. You must not exceed the limit of 20,000 words excluding bibliography. That will probably, to your surprise, become a problem; but the exercise of pruning is a valuable one, encouraging clarity and precision which you should be aiming for in any case.

Some general advice: (i) explain in your introduction just what you are going to do, and in what follows present the argument, step by step, in as sharp a focus as you can achieve: (ii) it is much better to be candid about difficulties than to sweep them aside or fudge issues, and you should show that you appreciate the force of counter-arguments; (iii) bad grammar and bad spelling diminish clarity and detract from an overall impression of competence.

Your bibliography should list all works to which you refer, plus any others you have used that are relevant to the final version. The style for references can be modelled on any recent philosophy book or periodical. The rules for format and submission are in the Examination Regulations.

If for any reason you expect to submit your thesis late, consult your Senior Tutor in good time. The Proctors may grant permission (in which case payment of a fine for late-presentation may be required). If permission is refused the thesis may be rejected or it may be accepted but penalised by reducing its mark.

The deadline for submitting two bound copies of the thesis is noon on Friday of the week before the Trinity Full Term of the examination, which is **Friday 26th April 2019**, to the Examination Schools, Oxford, addressed to the Chair of the Examiners in the Honour School of Philosophy and Computer Science.

4 Studying, learning and teaching

4.1 Lectures

Lectures are the main forum where course material is presented. Each term's Computer Science lecture timetable with details of lecture rooms is posted online at www.cs.ox.ac.uk/teaching/timetables/

Those for mathematics appear on the screen in the Mathematical Institute, and can also be found online at www.maths.ox.ac.uk/notices/lecture-lists.

It is usual for lectures to take place at the same times and in the same places for each of the eight weeks of full term, but for some courses the time or place may vary.

Most of your Computer Science lectures will be in the buildings of the Department of Computer Science, many of your Mathematics lectures will be in the Mathematical Institute. The lecture lists show where each lecture will be held.

Lectures generally start at 5 minutes past the hour, to enable everyone to get there on time. Please try to be there in good time, as late arrivals can be very disruptive.

You are expected to bring writing materials to lectures in order to make notes. Some lecturers provide handouts, but these are generally not a complete record of everything that is covered in the lecture. You should aim to develop the skills of effective note-taking to make the most of lectures. Most course materials are available from the Computer Science website.

4.2 Tutorials in Computer Science and Mathematics

Tutorials are your main opportunity for developing a deep understanding of a subject – and for sorting out misunderstandings. On average you can expect to have two or three tutorials or classes per week. Each tutor has particular methods and particular ways of organising tutorials, and will adapt your tutorials to give you the best opportunities for learning. Many tutors will base their tutorials around problem sheets issued by lecturers to accompany their lectures. Your tutor should be the first person you ask for advice on how to study, and later on how to choose optional subjects.

4.2.1 Problem sheets

Lecturers will usually suggest exercises that relate to the material in their lectures. Your attempts at these will often be taken as a framework for the tutorials or classes that accompany the course. In some cases you will find the sheets of suggested problems give you only a start on work in the subject; in others you will find that the sheet consists of a range of exercises intended to suit groups with different backgrounds and that your tutor suggests that you tackle only some of them.

Problem sheets for courses in Computer Science subjects are normally available from www.cs.ox.ac.uk/teaching/courses/

4.3 Tutorials in Philosophy

For tutorials in Philosophy you will be expected to bring knowledge of the readings which have been set for it (or a variant on your own initiative if some items prove really inaccessible) and almost always an essay in which you address some aspect of the topic covered by the readings.

Work on a tutorial essay in Philosophy involves library searches, reading, thinking, and writing. It should occupy a minimum of three days. Read attentively and thoughtfully, skipping bits that obviously do not bear on your topic: one hour of that is worth many hours of `summarising' paragraph by paragraph. As your reading progresses, think of a structure for your essay (but do not write an elaborate plan which you won't have time to execute). Expect to have to worry out your thoughts, both during and after reading. Use essays to develop an argument, not as places to store information. You can assume that your tutor knows what is in the set reading, and is not interested in a simple re-hash of that. But they will be interested in your critical appraisal of what you have read, and any arguments of your own that bear upon the topic. At the same time, it is important that the relation of what you say in your essay to what you have read can be made explicit if discussion in tutorial turns on it, and for this reason, it is important to include page references to your readings for points you criticise or make use of.

You will learn a lot if you share and discuss ideas with your fellow students, and if you chance your arm in tutorials. Be enterprising, and be prepared to be wrong, for that is how one learns. (Remember that Oxford's system is not one of continuous assessment; it is what you can do at the end that matters, and not the various mistakes that you will inevitably make on the way.) And bear in mind that tutorials are not designed as a substitute for lectures, or for accumulating information, but to develop the capacity to think on the spot and to articulate your thinking clearly in responding to issues raised about ideas in the essay you or a tutorial partner are presenting. This means that note-taking, if it occurs in a tutorial at all, should be incidental to the dialogue. Producing essays for philosophy tutorials gives excellent training in writing, and particularly in writing to a deadline. You will need to equip yourself with a writer's tools, most crucially a dictionary, such as the Concise Oxford Dictionary or the online Oxford English Dictionary, also a thesaurus, and a guide to grammar such as Fowler's Modern English Usage.

4.4 Practicals

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; you will learn skills like programming, testing, and implementing programs you have created. Demonstrators at the practical sessions are there to help you get the most from the sessions.

You will find more information about how to sign up for practicals (sign up, signing off and submission of reports, assessment), in the Courses section of the website of the Department of Computer Science.

Writing Practical Reports:

Each practical requires a report to be submitted for assessment. 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.
- You need to complete a cover sheet and attach it to your report.

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 decide that you failed the examination or reduce your overall classification. You need to pass this requirement in each part of the examination.

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, the demonstrators will not mark work that is late, unless there are extenuating circumstances. If there is a good reason why you can't submit your practical on time, for example because you were ill, then you may, with your tutor's permission, submit your practical late.

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

4.5 Group Design Practical

The second year course also includes a group design practical as part of the practical requirements for the year. This will allow you to practise the skills you learnt in the core programming courses, and to begin to develop a range of further skills including team-working, project and time management, and presentation skills.

The group design practical is intended to take you 20-30 hours, mainly during Hilary term. There will be a briefing meeting early in Hilary term, setting out the aims and format of the exercise and listing several possible problems to tackle. You will then be allocated to a team of around 5 people to work on one particular problem together. Each team will be allocated a member of staff to act as a supervisor, and will have three meetings with their supervisor during the project.

The first meeting with the supervisor will take place at the beginning of Hilary term, where the group will present a specification and project plan.

The second meeting with the supervisor will take place in Hilary term: the group will present their initial module implementations and test results.

The third meeting will take place in Trinity term: the group will demonstrate their product and deliver a brief final report. Each student will also deliver to the supervisor a one-page summary of their individual contribution.

Finally, the groups will present their work to students, members of the Department, and guests. This will take the form of a demonstration session, followed by a seminar where groups will take turns to describe their projects; and prizes will be presented.

The final group report and summary of individual contribution will be assessed as S+, S, Pass or Fail. The group design practical counts as one-third of the total practical mark for the second year and candidates are required to achieve at least a Pass. Your supervisor will submit your group report and your summary of your individual contribution to the Examiners to be considered along with your other practical reports.

4.6 Projects

As described in the *Examination Regulations*, undergraduates in the third and fourth years of the Final Honour School of Computer Science are required to undertake a project. Mathematics & Computer Science undergraduates are required to undertake a Computer Science project or a Mathematics dissertation in their fourth year. Computer Science & Philosophy undergraduates may choose to undertake a Computer Science project or a Philosophy thesis in their fourth year. The website of the Department of Computer Science contains a dedicated page on Undergraduate student projects. Please consult if for advice on finding a topic or a supervisor, for a list of projects, sample projects, and for downloading the project registration form.

Writing the report

Your report is the only way that your achievement is communicated to the examiners. Its writing should therefore be treated as a substantial part of the work involved and a suitable amount of the time should be allocated to it – perhaps a fifth.

It is a very good idea to write the report as you go along: it is far easier to describe things when they are still fresh in your mind. Of course, your ideas will develop as the project proceeds, so you will have to go back and revise material at the end.

Structure and contents

The Examination Regulations do not lay down a format for the report. It should be considered to be a technical document designed to be readable by a computer scientist who is not a specialist in the topic, say one of your colleagues.

The sort of structure that would suit many programming projects is as follows:

- Abstract: a brief description of what you did; no more than a page.
- Contents.
- Introduction: a description of the objectives of the project, and what makes them worthwhile; an overview of the achievements; a road map of the report.
- Background: any background information that the reader will need to know (and is unlikely to already have) to understand the rest of the report.
- A brief explanation of why the technical solution (such as a programming language and libraries) was chosen.
- Requirements: a description of the requirements of the program.
- Design: maybe including: a description of how you broke the problem down, perhaps supported by class diagrams and/or sequence diagrams; a description of any interesting algorithms or data structures that you used; a description of the user interface, perhaps supported by screen shots. Note that UML class diagrams on their own are usually not sufficient to explain a design.

  You should make it clear why the design of your program can be expected to solve the problem. You might like to discuss alternative designs that you considered, and why you decided that they were less appropriate than the one you chose.
- Testing and evaluation: describing what strategy you used to test the program or evaluate its usability or performance, and how the results compared with those that were expected.
- Conclusions: a summary of your achievements; a critical appraisal, describing what worked well and what could be improved; a discussion of the lessons you have learnt from the project.
- References: giving author, title, and publication details of works to which you referred.

- Appendices: supporting material not needed in the text. It is not required that you include a listing of the program you have written, though many reports do so. Any code that you do include in an appendix must be well laid-out, properly divided into manageable modules and subroutines with well-chosen names, and provided with appropriate comments. Note that the body of the report should be comprehensible without reading the appendices.

If you have carried out a more experimental project, then you should discuss how you designed the experiment(s), your results, and the conclusions you draw from them. A good project will always contain a significant amount of *analysis and assessment* of the results that have been obtained. It's not enough to produce a program, say that you've tried it a couple of times, and that it seems to work! The analysis and assessment component of a project may take many forms, depending on the nature of the project itself. For programming projects it may take the form of a systematic approach to testing, a careful analysis of competing design choices, or a thorough evaluation of the effectiveness of the program for the problem it was created to solve.

It is appropriate for supervisors to read and comment on a draft of the report, and to offer advice on suitable references and methods. It is also possible for the work reported upon to be a part of a piece of work being 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 you alone (except for any clearly identified common material in joint projects). **Please see the Appendix on plagiarism.**

Submitting the Report

The *Examination Regulations* include bounds on the length of the report: it should not exceed 10,000 words and 40 pages of additional material. Note that these figures are *limits*, not targets.

Two copies of the report are required. It should be legible, and you will be expected to type it. (The regulations may not seem to be clear about this, but 'typed' is intended to allow 'LaTeXed', or otherwise word-processed.) The copies of the report which you hand in should be securely bound. This does not mean that you need to go to a bookbinder's: any of the various ways of securing the pages of a short document to each other will do, but please make sure that you do not hand in something which can fall apart.

Your supervisor will be asked by examiners to answer a questionnaire about the project and the amount of help they gave. This questionnaire helps the examiners to satisfy themselves that the project is your own work, and to assess the contribution you made in carrying it out. Your supervisor will want to be able to report to the examiners that the software is working properly, and for this purpose you should make sure that (s)he sees a demonstration of it in action towards the closing stages of the project. It is up to you to agree with him or her when this takes place and what form of demonstration is appropriate to the kind of software you have

developed. There is no need to arrange a separate, formal demonstration if the supervisor has seen the software in action over the course of its development.

Note that it is pointless to include a CD with your project submission, or to refer to a web page where the project results can be found. The assessors cannot be expected to take the time to load the software from all projects, and since a CD is not a required part of your submission, it would be wrong of them to give you extra credit for what it contains, compared to someone else who submitted a clear report with no CD.

Style

The aim of the report is to communicate what you have done to a reader who is not an expert in the area of your project. Good style will help you; poor style will obscure your intent. You should therefore put effort into presenting your ideas as clearly as possible. If you do not have much experience of writing, then it is a very good idea to read a book or article on the subject, such as The Elements of Style, by William Strunk, Jr, and E.B. White; Clarity in Technical Reporting by S. Katzoff, NASA. Think about what you want to say, and the order in which you want to say it: try to identify a clear flow of ideas.

Make your points in a clear and unambiguous manner. Use diagrams and graphs where they enhance or clarify the text.

Help the reader as much as you can. Insert sentences at the beginning of sections to summarise the main ideas: that way, the reader knows what to look out for. Insert sentences at the end of sections to reiterate the main ideas: that way, the reader can be sure (s)he has picked up the main points. If you include some mathematics, you should also include some words describing its meaning. Include examples to help illustrate difficult ideas.

Try not to include irrelevant material to pad out your report. This may result in the reader becoming bored and losing concentration. On the other hand, it is important to include small details which are essential to the reader's understanding.

Your supervisor will read your draft text and help you with its content, accuracy and style. But you should make any draft as good as you know how before showing it to your supervisor. Your implementation of the advice you get is your own responsibility. You should not expect your supervisor to read your final draft: that is the task of the examiner.

Originality

It is of the utmost importance that your project report is your own work. Whenever you include a quotation, or paraphrase of the work of others, you should make this clear by giving a reference. Direct quotations should be within quotation marks, or indented. Such direct quotations should be rare, such as where you want to discuss another writer's opinion. Do not be tempted to construct large sections directly from sources: the examiners want to see evidence that you understand the material, not just that you are able to use Google and cut and paste. Your project supervisor will be able to give you advice about the style and format of references, and the extent to which they are needed when you describe the background to your work. *Sources*

which must be acknowledged include all materials that have been written by others, whether printed or electronic, published or unpublished. **Please see the Appendix on plagiarism.**

Declaration of Authorship

When you submit your project report you are also required to submit a declaration of authorship. You will need to complete this form to declare that the work you are submitting is your own, except where stated otherwise, and to include it in the envelope with your report when you submit it to the Examination Schools.

For details about how project reports are assessed, please refer to the Examination Conventions.

4.7 Expectation of study and student workload

This document concentrates on the *teaching* arrangements for the course, but of course the important thing is *learning*. We will provide facilities and resources to assist your learning, and do what we can to help and encourage you to learn; but you are responsible for your own academic progress.

As well as attending and preparing for lectures and tutorials, you will need to read other material and to work through additional problems to fully master the course material. The lists of books which accompany course synopses are a good place to start on further reading, and (as always) your tutor will be able to suggest further avenues of study.

It is particularly important to do exercises, both paper-and-pencil calculation and design exercises, and practical work with a computer. There is nothing which fixes and deepens understanding of material in a field like this quite like 'doing it yourself'.

You may want to have a look at Charles Batty's notes *How do Undergraduates do Mathematics?* which, as well as being relevant to any Mathematics courses you take, might help you with your Computer Science courses. It can be found on the Web at https://www.maths.ox.ac.uk/system/files/attachments/study_public_0.pdf. The University provides also very useful guidance on the Study Guidance Website.

If you feel you have just Too Much To Do, please get in touch with your college tutor or the academic administration team in the Department. We will be able to help you.

On this note, please read the University's guidance on paid work.

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 the Complaints and Appeals section below.

4.8 Important Dates

4.8.1 Dates of term 2018-19:

Michaelmas term:	Sunday 7th October 2018 – Saturday 1st December 2018
Hilary term:	Sunday 13th January 2019 – Saturday 9th March 2019
Trinity term:	Sunday 28nd April 2019 – Saturday 22th June 2019

Dates of Full Term for future years are available on the University's website.

4.8.2 Hand-In Dates – Practicals and Project Reports

Practicals (All years and all programmes of study)

- By noon on Friday of week 5, Trinity term
-

2nd Year Compilers Practical Assignment

- By noon on Friday of week 2, Hilary term (to the Examination Schools)

2nd Year Group Design Practical

Final Report – By Friday of week 2 of the Trinity term – you can find more information on the Department's website.
Presentation – Week 3 of the Trinity term – day to be confirmed.

3rd Year Computer Science Project Report

- By noon on Monday week 5 of Trinity term, (to Examination Schools)

4th Year Computer Science Project Report

- By noon on Monday week 5 of Trinity term, (to Examination Schools)

5 Examinations

Please see also the University's Examinations and Assessments website.

5.1 Preparation

Your tutor will advise you about revision and practice. As well as any consolidation work done after the end of a term, it is usual to spend at least a good part of Trinity term revising work for that year's examinations.

In subjects that have been taught in previous years, past examination papers are good guides to the sort of examination question that you might be set. In newer subjects you will usually be offered model questions, or some other guidance on the sort of thing to expect. Past papers can be found on the Web at www.cs.ox.ac.uk/teaching/examinations/ and OXAM.

Also available are the *Examiners' Reports* for the past few years, which contain – amongst other things – the examiners' reflections on which questions turned out to be very difficult or had other problems.

5.2 Entering

Entering for examinations is completed online – please see the University's guidance here. You will receive an email invitation to login to 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 few weeks before the examinations begin a timetable showing where and when each of the written papers will happen will be published online. Together with your timetable you will receive a randomly allocated *candidate number* which you will use to identify your scripts, instead of your name and College, so that they can be marked anonymously.

Information on the standards of conduct expected in examinations, what to do if you would like examiners to be aware of any factors that may have affected your performance before or during an examination (such as illness, accident or bereavement), alternative arrangements and more are available on the Oxford Students website on Examinations and Assessments.

5.3 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 academic admin team. These notices contain important information about your examinations and should be read very carefully. If you have any questions then please ask your tutor; you must not contact the examiners directly.

5.4 Examination Conventions

Examination conventions are the formal statement of the specific assessment standards for the course or courses 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 Examination Conventions for all undergraduate degree programmes can be found at https://www.cs.ox.ac.uk/teaching/examinations/

There are three sets of University examinations which you have to pass on your route to a BA degree: Preliminary Examinations ('Prelims') at the end of your first year, and the two parts (Parts A and B) of the Final Honour School ('Finals') at the end of your second and third years. These are called the *public examinations*, as opposed to any *collections* which are tests that your College may set you from time to time to help keep you on your toes and to assess your progress. If you carry on to do a Masters degree, you will take additional public examinations in the fourth year (Part C).
For all exams, the examiners base their assessment of your performance in the examination on a mark out of 100 assigned for each paper; they might decide to scale a paper if it seemed students found it more difficult than others. The examiners have the discretion of taking Factors Affecting Performance applications or other evidence into account when arriving at standardised marks for each paper.
The marks for each paper are combined to obtain an overall mark out of 100.

5.5 Procedure for Written Examinations

Your Preliminary Examinations are likely to be held at Ewert House in Summertown. You can expect your second and third year examinations to be held in the Examinations Schools on the High Street. Different papers happen in different rooms around the building, as detailed in the entrance hall.

You must wear full academic dress (sub fusc, gown and mortar board/cap) to attend public examinations, and you must bring your University card and your own stationery with you. Please find more information on what you can and cannot take into an examination here.

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 to find out why not. If you get there in the first half hour, you will still be permitted to sit the exam, although you will have less time. 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.

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 booklets of ruled A4 paper in which to write your answers. The University's regulations require that you write in black or blue ink, rather than pencil, although you may use pencil for any graphs and drawings. Please start the answer to each question on a new booklet. This makes it much easier for the marker(s) – sometimes exam scripts need to be split between markers, and that's difficult to do if you have the answer to more than one question in a booklet. If you do start part way through a booklet by accident, please make a clear note of the fact!

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 available 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 an empty booklet for that part, so that the examiners can check that all parts of all papers are accounted for.

5.6 The Preliminary Examinations

On Preliminary Examination papers for Computer Science and Mathematics, each question is marked out of 20. Each question will contain some parts of a straightforward nature, and some parts requiring more advanced understanding or an unseen application of techniques or theory from the syllabus. The examination paper will show the marks available for each part.

5.6.1 Computer Science

In the Preliminary Examinations for Computer Science you will take the following **four** papers:

A10097W1 Functional Programming and Design and Analysis of Algorithms
A10098W1 Imperative Programming
A10100W1 Discrete Mathematics, Continuous Mathematics and Probability
A10101W1 Digital Systems, Linear Algebra and Introduction to Formal Proof

A10097W1 Functional Programming and Design and Analysis of Algorithms

is of 3 hours' duration and contains eight questions (four on each constituent course); candidates should answer no more than five questions, with no more than three questions from either half of the paper.

A10098W1 Imperative Programming

is of 3 hours' duration and contains eight questions (two on Part 1, three on each of Parts 2 and 3); candidates should answer no more than five questions, with no more than two questions from any part of the paper.

A10100W1 Discrete Mathematics, Probability, and Continuous Mathematics

is of 3 hours' duration and contains nine questions (three on each constituent course); candidates should answer no more than five questions with no more than two from each section.

A10101W1 Digital Systems, Linear Algebra and Introduction to Formal Proof

is of 3 hours' duration and contains eight questions (three on Digital Systems, three on Linear Algebra and two on Introduction to Formal Proof); candidates should answer no more than five questions with no more than two from each section.

Please see also the course description above and the Examination Regulations here.

5.6.2 Mathematics & Computer Science

Mathematics & Computer Science candidates take **five** papers; **Functional Programming and Design and Design and Analysis of Algorithms**, and **Imperative Programming**, as described above, and also

A10138W1 Mathematics I
A10139W1 Mathematics II
A10149W1 Continuous Mathematics and Probability

A 10138W1 Mathematics I

is of 2.5 hours' duration and contains seven questions (four on Part A and three on Part B); you should submit answers to no more than five questions. You should submit answers to no more than three questions from Section A and no more than two questions from Section B.

A 10139W1 Mathematics II

is of 2.5 hours' duration and contains seven questions (three on Part A, three on Part B and one on Part C); you should submit answers to no more than five questions.

You should submit answers to no more than two questions from Section A and to no more than two questions from Section B.

A10149W1 Continuous Mathematics and Probability
is of 2.5 hours' duration and contain six questions (3 on each constituent course); candidates should answer no more than four questions.

Please also see the course description above and the Examination Regulations here.

5.6.3 Computer Science and Philosophy

Computer Science and Philosophy candidates take five papers; **A10097W1 Functional Programming and Design and Analysis of Algorithms** and **A10098W1 Imperative Programming** as described above, and also:

A10102W1 Discrete Mathematics and Probability
A10103W1 Introduction to Philosophy
A10134W1 Elements of Deductive Logic

A10102W1 Discrete Mathematics and Probability

is of 2.5 hours' duration and contains six questions (3 on each constituent course); candidates should answer no more than four questions.

A10103W1 Introduction to Philosophy

is of 3 hours' duration and contains twelve questions (six on Part A and six on Part B); candidates should answer four questions, including at least one from each section.

A10134W1 Elements of Deductive Logic

is of 3 hours' duration and contain typically seven or eight questions; candidates should answer four questions. If you answer more than four questions, your overall mark will be determines by your four best answers.

Please also see the course description above and the Examination Regulations here

5.7 Examinations for Part A, B and C

5.7.1 Computer Science

The examinations for Part A will be sat at the end of your second year:

A12069W1 Concurrent Programming, A16156W1 Algorithms and A10406W1 Models of Computation will each be examined by a 2 hour written examination at the end of your second year.

A10401W1 Compilers will be examined by an assessed practical (35% of the marks) and a 2 hour written examination (65%).

Instructions for the assessed practical will be handed out on Friday in week 8 of Michaelmas term, and the practical report must be handed in to the Examination Schools, High St., Oxford by noon on Friday of week 2 of Hilary term. The assessed practical will incorporate and extend elements of the lab exercises that were set during term. As always, the work you submit must be your own, except where explicitly acknowledged.

Appendix A sets out the standards that are expected in this regard. Please see also the University's guidelines for academic good practice.

The examinations for Part B will be sat at the end of your third year.

The examination papers will have three questions, and you may attempt two of them. In finals papers, questions are marked out of 25. The marks for each part of each question will be indicated on the examination paper.

In the third year you are also required to submit a project report.

In the fourth year of Computer Science (**Part C**) you are required to take five courses and a Computer Science project. The courses are chosen from a schedule called C1, which is published at http://www.cs.ox.ac.uk/teaching/bacompsci/PartC/
Most courses will be assessed by mini-project, with the exception of Computational Game Theory and Probabilistic Model Checking, which will be examined by 3-hour written paper in Trinity Term.

5.7.2 Mathematics & Computer Science

Second year Mathematics and Computer Science students take the following Maths papers:

- A0 Linear Algebra, which will be 1.5 hours.

This paper includes three questions and you should answer two; each question is marked out of 25.

- A2 Metric Spaces and Complex Analysis, which will be three hours.

This paper includes six questions and you should answer four. The best four questions count towards a candidate's total mark for the paper.

In addition, candidates must offer either two papers from papers A3-A5, A7-A11 or one paper from A3-A5, A7-A11 and paper ASO

You must also take two core Computer Science courses: A10406W1 Models of Computation, and A16156W1 Algorithms. These courses will be examined at the end of the second year.

In your third year, you must choose at least two **Part B** options from Schedule S2 for **Maths**.

For **Computer Science**, for **Part B** of your examination at the end of your third year, the Computer Science courses will be examined by 2-hour papers each paper which will have three questions, and you should attempt two of them. Questions are marked out of 25. The marks for each part of each question will be indicated on the examination paper. The Compilers course will be examined by assessed practical and written paper as for Computer Science (see above).

In the fourth year of Mathematics and Computer Science (**Part C**) you are required to take either five courses and a Computer Science project *or* six courses and a Mathematics dissertation. The courses are chosen from Schedule C1 and Schedule, C2. There is no restriction on the number of courses chosen from each schedule. The schedules are published at http://www.cs.ox.ac.uk/teaching/mcs/PartC/. Note that if you choose to submit a Mathematics dissertation, you must also choose at least two other Mathematics courses.
For Computer Science, most courses will be assessed by mini-project, with the exception of Computational Game Theory and Probabilistic Model Checking, which will be examined by 3-hour written paper in Trinity Term.

5.7.3 Computer Science and Philosophy

Apart from two Computer Science Part A core courses, you have to take an equivalent of 14 option "course-equivalents", with at least four from Computer Science, and at least six from Philosophy. The remaining four may be chosen from either discipline without restriction, as outlined above.
These subjects will be examined at the end of the second year, in your **Part A** examination.

Your Computer Science options from Schedule S1(CS&P)will be examined in your **Part B** examination at the end of your third year.

All Computer Science options will be examined at the end of the third year. The Computer Science courses will be examined by 2-hour papers each paper will have three questions, and you may attempt two of them.

In finals papers, questions are marked out of 25. The marks for each part of each question will be indicated on the examination paper. The Compilers course will be examined by assessed practical and written paper as for Computer Science (see above).

Fourth Year (Part C)

Computer Science courses are chosen from Schedule C1. Philosophy courses are chosen from courses 101-120, 122, 124, 125, 127 and 180, as described on the Philosophy Faculty Website. Each Philosophy course will be assessed by a 3-hour written examination together with an essay of at most 5,000 words.

Fourth year Computer Science options will be examined either by a sit-down paper, or by a mini-project. Most courses will be assessed by mini-project, with the exception of Computational Game Theory and Probabilistic Model Checking, which will be examined by 3-hour written paper in Trinity Term.

Although you will be doing examinations at the end of each term, you will be entering for these exams in the normal way (i.e. Friday of Week 2, Hilary term). You must make sure you enter for the examinations that you took in Michaelmas term.

Rules for Philosophy theses are described in the Examination Regulations except that the word limit is 20,000 words. More advice on Philosophy essays and theses will be issued later in the year.

The deadline for submitting two bound copies of the thesis is noon on Friday of the week before the Trinity Full Term of the examination, which is **Friday 26th April 2019**, to the Examination Schools, Oxford, addressed to the Chair of the Examiners in the Honour School of Philosophy and Computer Science.

Philosophy Essays in Part C

Each Philosophy unit, other than a Thesis, is examined in a 3-hour paper together with a submitted essay of not more than 5,000 words. No essay shall exceed this word limit, which includes all notes and appendices, but not the bibliography. The word count should be indicated on the front of the essay. There shall be a select bibliography or a list of sources. All essays shall be typed on A4 paper with footnotes rather than endnotes. You should avoid any substantial repetition of material between examination scripts and examination essays.

Prescribed topics for Part C essays for each permitted Philosophy subject consist of the questions set for the most recent examination of that subject in Honour Schools with Philosophy, with the following exceptions:

The multiple passages for comments on Plato: Republic (subject 115)

The multiple passages for comments on Aristotle: Nicomachean Ethics (subject 116)

The formal exercises on Philosophical Logic (subject 127);

(these questions consist of passages for comment from the set text and so are not suitable as essay topics). Past examination papers can be downloaded from http://www.oxam.ox.ac.uk Normally the most recent paper will be that set in the previous academic year. But note that in any given year examinations may not be set on every subject. This explains why topics are taken from the most recent paper rather than from the previous year's paper.

You may apply for approval of essay topics not prescribed by writing to the Director of the Undergraduate Studies, Philosophy Faculty, c/o the Undergraduate Studies Administrator, Faculty of Philosophy, Radcliffe Observatory Quarter, giving the title you propose, together with an explanation of the subject and enclosing a letter from your tutor attesting to the suitability of this topic for you. Any such application must be received no later than **Friday of the sixth week of the Hilary Term preceding the Part C examination for which the essay is to be submitted.** Late applications will not be considered. Any such application shall be accepted or rejected within two weeks of its being received

The relative weight of the essay to the three-hour exam shall be 1 to 3, i.e. the essay shall count for 25% of the mark in that subject.

Each essay shall be the candidate's own work, though it should show knowledge of relevant literature in the subject and may include passages of quotation or paraphrase so long as these passages are clearly indicated as such and the source properly attributed. The candidate may discuss a first draft of the essay with his or her tutor for that subject. The amount of assistance the tutor may give shall be limited to what can be provided in one of the candidate's tutorials for their study of that subject. For each essay the candidate shall sign a statement to the effect that the essay is his or her own work. This statement shall be placed in a sealed envelope bearing the student's candidate number and the name of the subject for which the essay has been written and presented with two copies of each essay. Each copy of an essay shall be identified only by the candidate's examination number and bear the name of the Philosophy subject for which the essay is being submitted and must be **submitted not later than noon on Friday of the first week of the Trinity Full Term of the examination, 3rd May 2019** to the Examination Schools, High Street, Oxford, addressed to the Chair of the Examiners for Part C of the Final Honour School of Computer Science and Philosophy.

5.7.4 Computer Science Mini-Projects

Computer Science mini-projects will be handed out on the last Friday of the term in which the subject is being taught, or for subjects shared with the MFoCS course

Monday of week 8 of the term in which the subject is being taught. This information will be included in the Notice to Candidates sent out each term.

Mini-projects must be either handed in to the Exam Schools or uploaded to the Computer Science PartC MSc CompSci MiniProjects WebLearn site by noon on the date specified below. The mini-project will be designed to be completed in about three days. It will include some questions that are more open-ended than those on a standard sit-down exam. The work you submit must be entirely your own work. If you make use of material from web-sites, books, articles or other sources you must acknowledge these and give suitable references. **Please see the Appendix on plagiarism.**

Michaelmas Term 2018/19

Course	Lecturer	Mode of Submission	Page Limit Typed	Page Limit Handwritten
Categories, Proofs & Processes	C. Constantin	Online	20	20
Computational Learning Theory	V. Kanade	Online	/	/
Computer Aided Formal Verification	A. Abate	Online	/	/
Computer Security	B. Roscoe	Online	8	15
Concurrent Algorithms and Data Structures	H. Nickau	Online	/	/
Physically-Based Rendering	S. Gogioso/ J. Happa	Online	8-10 + source code*	
Principles of Programming Languages	S. Staton	Online	/	/
Quantum Computer Science	B. Coecke	Online	/	/
Foundations of Computer Science	E. Kostylev	Online	/	/

* Word or Pdf, combined with source code in one zip file.

The submission deadline for the all mini-projects listed above is 12pm on Wednesday, 2nd January 2019.

Trinity Term 2019

Course	Lecturer	Mode of Submission	Page Limit Typed	Page Limit Handwritten
Advanced Security	M. Goldsmith/S. Creese	Paper	/	/

Automata, Logic & Games	S. Almagor	Online	/	/
Categorical Quantum Mechanics	J. Vicary/D. Marsden	Paper	/	/
Computers in Society	M. Taddeo	Online	3000 words	/
Concurrent Programming	G. Lowe	Online	/	/
Database Systems Implementation	D. Olteanu	Online	/	/
Advanced Machine Learning	Y. Gal and T. Lukasiewicz	Online	/	/
Probability & Computing	E. Koutsoupias	Online	8	8

The submission deadline for online submissions is 12pm on Monday 15th April 2019. The submission deadline for paper submissions is 12pm on Thursday 25th April 2019.

Computational Game Theory and Probabilistic Model Checking will be examined by 3-hour written paper in Trinity Term.

5.7.5 Progression to Part C

You will have the option of continuing for a fourth year, if you have achieved at least upper second class Honours (2.1) in the second and third years together.

In the event that you do not meet the progression requirement, there is an appeal process whereby you might ask that this regulation be waived in your case. For further guidance please refer to the Examination Conventions.
Please be aware that the fourth year of your course is a challenging masters year and that in most cases at least a 2.1 is needed as an indicator of likely success; consequently the department will only support the appeal if there is a good academic case nonetheless. Successful appeals have usually had an overall USM at Parts A and B close to 60 (which corresponds to a 2.1) and/or a clear sense of progress from Part A to Part B (showing that you are coping well as the course becomes more difficult) and/or good marks in those options which you plan to continue studying into Part.
Strong support from your college is also expected.

6 Feedback on Learning and Assessment

During your time at Oxford there will be plenty of opportunities for you to get informal feedback: tutorial sessions provide your tutors with an opportunity to give you informal feedback on your academic progress, and the same goes for classes, practicals and even working groups with your peers.

6.1 Formative Assessment

There are various opportunities for you to receive feedback on formative assessment: your tutor will give you feedback on tutorial essays and college collections, and the practicals demonstrators will mark your practicals reports.

6.2 Summative Assessment

Apart from your marks, you will not normally get individual feedback on public examinations. However, the Freedom of Information Act 2000 provides a right of access to information held about you, which includes examination material. If you failed an examination paper you and your college tutor will be able to see your script, so that he or she can explain to you what went wrong.
Examiner's reports serve as a source for feedback on the performance of your cohort, as they include statistics on paper marks and overall outcomes, and contain the assessor's reports on each paper.

You also have the opportunity to provide feedback to us:

Your views on how well your course works are an important part of the mechanism for determining how we can improve it for the future, so there are many opportunities for you to comment on the course.

Informally, you can make your views known directly to the academic staff who teach you in lectures, classes, and tutorials. In particular, you might like to make comments to your College Tutor, the Chair of the Faculty or the Director of Teaching. All academic staff will encourage you to make your views known to them and will give you ample opportunity to comment on syllabus content and any other issues about the delivery of the course.

6.3 Course questionnaires

Formally, feedback for courses is given via online and/or paper course questionnaires. You will be invited by email to complete an online survey on all aspects (lectures, classes and practicals) of the courses you have attended each term or the course lecturer will ask you to complete a paper questionnaire towards the end of the course. Even if you have decided not to continue on the course, you are

welcome to give feedback and let us know why. Student feedback is greatly valued by the Department and plays a large part in the quality assurance process.

The Senior Management Team and the Education Committee in the Department of Computer Science review all courses after they have run, looking in particular at feedback from questionnaires, to consider ways of improving the teaching. Proposed changes to the syllabus and synopsis of courses are also considered by these committees, and an analysis of the statistics on each course is sent to the lecturer of that course.

6.4 University-wide Feedback

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 online.

Final year undergraduate students are surveyed instead through the National Student Survey. Results from previous NSS can be found at www.unistats.com

7 The University and you

7.1 The Faculty of Computer Science

The central administration of the University is devolved to a number of *divisions*, amongst them the Division of Mathematical, Physical and Life Sciences (MPLS), which is in practice the authority that controls your degree course.

Within the MPLS Division, the Department of Computer Science controls the development of the subject in the University. The members of the Department meet at least once a term to discuss matters including changes to the composition of the degree, and to consider reports on the previous year's teaching and examinations. You can find a list of the departmental committees on the intranet.

7.1.1 The Undergraduate Supervisory Committee

Detailed administration of the Computer Science courses is conducted by the Undergraduate Supervisory Committee of the Department of Computer Science which is chaired by the Director of Teaching. The Mathematics Department is also represented on this committee.

7.1.2 Joint Consultative Committee for Undergraduates (JCCU)

We have a formal structure for undergraduate consultation and representation in Computer Science. The JCCU is a committee which is elected from the student body with a representative from each year of each degree within Computer Science. There is an open meeting in week 3 in which the Chair of this committee will invite students to nominate or volunteer for a position on the committee. The committee meets in week 4 of each term to discuss any issues raised by student representatives.

In addition one or two members of the committee will be invited to attend the Faculty meeting in week 6 of each term to raise any issues there, as appropriate.

7.1.3 The Mathematics Undergraduates Representative Committee (MURC)

The Mathematics Undergraduates Representative Committee (MURC) is organised by undergraduates on the various Mathematics and Computer Science degrees. It has representatives at each of the colleges, and acts amongst other things as a formal channel for bringing feedback directly to the central administration of these subjects.

7.1.4 Division and University representation

Student representatives sitting on the Divisional Board are selected through a process organised by the Oxford University Student Union (OUSU). Details can be found on the OUSU website along with information about student representation at the University level.

7.2 The Proctors

With luck (and good judgement on your part) you will not have much to do with the Proctors. The Proctors (two of them) and the Assessor (one of them) are senior members of colleges, elected for a year at a time by their colleges in turn to keep the University in line. They have many administrative duties, but some in particular may bring them into contact with undergraduates.

The Proctors are responsible for ensuring that all examinations are conducted properly, for implementing student discipline at University level, for registering student clubs and societies, and for investigating complaints. In this latter capacity they may summon any member of the University to appear before them. The Assessor has special responsibilities for student welfare. Based in a separate section of the University Offices in Wellington Square, the Proctors and Assessor are supported by the Clerk to the Proctors and a small secretarial staff.

7.3 Student Life

On the University's webpages for students, you will find a host of information about practicalities to do with all aspects of student life. This includes advice on academic matters, fees and funding, information on clubs and societies and much, much more.

You are very welcome to attend the Fridays@2 series at the Mathematical Institute. Fridays@2 are a series of seminars that start in Week 1 of Michaelmas Term. This weekly programme is designed specifically for undergraduate and masters students. The sessions are designed to help students to develop useful skills, to explore career possibilities, and to put their mathematics courses into a broader context. The sessions will run every Friday during term time at 14:00-15:00 in L1, followed by tea and biscuits in the South Mezzanine.
The Fridays@2 timetable can be found at https://www.maths.ox.ac.uk/events/list

Looking after yourself is very important. It might be a good idea to join a club or society, or do sports. Even if you have got a lot of work to do, do take breaks, eat (healthily) and sleep! Try to find things that make you feel happy, and spend the right amount of time on social media. (Find an article on the impact of social media use on sleep here.) And how about a reading about positive news every now and again?

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 on the Oxford Students website.

7.4 When Things Go Wrong

Life can be a bit overwhelming at times for anyone, and it is crucial to seek support before it becomes All Too Much. If you are feeling unwell or unhappy, your college

should be your first port of call. Each 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. In addition, and especially for course-related matters, the academic admin team is always happy to help!

7.4.1 Health and Welfare

The University Oxford Students website contains comprehensive advice on a variety of issues around student health and welfare. You have free access to the National Health Service, and can see a GP (General Practitioner) when you need to. Emergency medical treatment can be obtained at the Emergency Department (A&E) of the John Radcliffe Hospital. You can find more advice on what constitutes a medical emergency, and what to do if a medical emergency arises, here.

If you experience sexual violence you can get help and advice here.

Please click here for a list of emergency contacts.

If you have a disability, or think you might, please find advice on how to get support here.

Your mental health is just as important as your physical health. Approximately 1 in 4 people in the UK will experience a mental health problem each year, and there is no shame in admitting you are one of them. There is a variety of things you can do yourself to boost your mental health. The University offers advice on self-help strategies, and a free counselling service for students. It is important that you **seek help as early as possible**, just like you would do if you had an infection, or broken a leg.
If you think you or someone you know might have a problem with their mental health, please speak to your college tutor.
If you need advice on where to turn, or someone to talk in the Department of Computer Science, please approach one of our Mental Health Champions. They have received training through Mental Health First Aid (England), regarding mental health which enables them to listen non-judgmentally, providing that first port of call within our department if you need it, and signposting further sources of support where necessary.

7.4.2 Harassment

By University legislation, it is an offence for any senior or junior member of the University to harass any other member or any person for whom the University is responsible. Sexual and racial harassment are among the forms of harassment covered by this rule, but it also covers any form of intentional or unintentional teasing, embarrassment or bullying which causes inconvenience or unhappiness, particularly if persistent.

The University's Oxford Students website provides help and advice for students here.

The Harassment Advisors for the Department of Computer Science are:

Mrs L Carveth (Room 114) Tel. 73833
Mrs J. Sheppard (Room 112) Tel. 73817
Professor L. Ong (Room 340) Tel. 83522

7.4.3 Complaints and Appeals

The University, the MPLS Division and the Department of Computer Science all hope that provision made for students at all stages of their course of study will make the need for complaints (about that provision) or appeals (against the outcomes of any form of assessment) infrequent.

If you do think you have grounds for a complaint or an academic appeal, you can find details about the University's complaint procedure here.

However, nothing in the University's complaints procedure precludes 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). This is often the simplest way to achieve a satisfactory resolution.

Many sources of advice are available within colleges, within faculties/departments and from bodies like Student Advice Service provided by OUSU or the Counselling Service, which have extensive experience in advising students. You may wish to take advice from one of these 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 Department's committees.

Complaints

If your concern or complaint relates to teaching or other provision made by the Department, then you should raise it with the Director of Teaching (Dr Ani Calinescu) or with the Director of Graduate Studies (Dr David Kay) as appropriate. Within the department the officer concerned will attempt to resolve your concern/complaint informally.

If you are dissatisfied with the outcome, then you may take your concern further by making a formal complaint to the University Proctors. The procedures adopted by the Proctors for the consideration of complaints and appeals are described on the Proctors' webpage, the Student Handbook and the relevant Council regulations.

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 the Senior Tutor. 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 defined as a formal questioning of a decision on an academic matter made by the responsible academic body.

For undergraduate or taught graduate courses, a concern which might lead to an appeal should be raised with your college authorities and the individual responsible for overseeing your work. It must not be raised directly with examiners or assessors. If it is not possible to clear up your concern in this way, you may put your concern in writing and submit it to the Proctors via the Senior Tutor of your college.

As noted above, the procedures adopted by the Proctors for the consideration of complaints and appeals are described on the Proctors' webpage, the Student Handbook and the relevant Council regulations.

Please remember in connection with all the academic appeals that:

- The Proctors are not empowered to challenge the academic judgement of examiners or academic bodies.
- The Proctors can consider whether the procedures for reaching an academic decision were properly followed; i.e. whether there was a significant procedural administrative error; whether there is evidence of bias or inadequate assessment; whether the examiners failed to take into account special factors affecting a candidate's performance.
- On no account should you contact your examiners including external examiners or assessors directly.

8 What next?

8.1 Higher degrees

Many of our graduates go on to do a higher degree – an MSc or a PhD or DPhil – at Oxford or elsewhere; perhaps that interests you.

An MSc may be the appropriate path for you if you expect to get at least a 2.1 in Finals and wish to specialise. In most MSc courses a project plays an important part; for that, evidence of academic motivation and independence of thought are important. There is a variety of interesting MSc courses around the country, many of which specialise in topics for which you may be well prepared, depending on your choice of subjects; they range from parallel processing, artificial intelligence, through computational statistics to numerical modelling. Your tutor will be happy to advise you.

If you expect to get a First in Finals you may be interested in doing a DPhil. It is important that you realise that a DPhil is not awarded simply for three years of programming. Whilst being adept at programming, you should also have a strong command of the theory and the relationship between the two. As an undergraduate you should have attempted not just the routine tutorial problems, but have demonstrated some creativity and ability to solve harder problems. You should have a critical outlook with strong motivation and independence of thought, and above all a desire to reflect on what you have produced, incorporating the result of your reflection into your work. Typically, you should hope to produce a thesis which makes some novel theoretical contribution and shows how it can be usefully applied.

Talk to DPhil students in the department; discuss the prospect with your tutor if you think you might be interested.

It is worth talking to potential supervisors early (ideally before the end of your penultimate year). This might give them time to find money to fund you!

To apply: the University of Oxford has published a very useful application guide. Applications are made online.

You will need references from two or three referees; it is usual to choose tutors, project supervisors and college lecturers.

If you have questions about graduate study in the Department of Computer Science please contact the Graduate Studies Administrator, Mrs Julie Sheppard in room 112 or by email julie.sheppard@cs.ox.ac.uk,

8.2 Careers

Information about careers is provided by Oxford University Careers Service, 56 Banbury Road. The Careers Service organise many events to help you choose a career that suits you, and to put you in touch with recruiters. Their web site is at: www.careers.ox.ac.uk

You are urged to contact the Careers Service for detailed information on careers, and also for advice on compiling a CV, on how to apply, and on interview technique.

When we receive information about careers suitable for Computer Science graduates, it is put on the Careers notice board in the basement of the Department of Computer Science or circulated by email. Information on job vacancies (together with summer internships and competitions) can also be found on our web site at www.cs.ox.ac.uk/industry/internal/vacancies.jsp (NB this site can only be accessed from within the Oxford domain).

[A] Plagiarism

The University's code of conduct concerning academic integrity is set out on the website here. Please read also the University's guidelines on academic good practice.

The following information and advice is of relevance and use to students for all their academic work, e.g. mini projects, third and fourth year projects, as well as all class and practical work.

Since plagiarism is treated as a serious breach of academic integrity, it is important that you ensure you that you understand fully what is meant by the term "plagiarism", how to avoid it in your writing and the potential consequences of either deliberate or inadvertent plagiarism.

We recommend that you complete this online plagiarism course before embarking on your project:

https://weblearn.ox.ac.uk/portal/hierarchy/skills/generic/avoidplag

At the end of the course there is a quiz to test your knowledge; if successful you can print out a certificate for your records. The course also provides an accessible source of information and advice about plagiarism. You should use it in conjunction with the advice on these pages.

What is plagiarism?
Plagiarism is the copying or paraphrasing of other people's work or ideas into your own work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition.

Collusion is another form of plagiarism involving the unauthorised collaboration of students (or others) in a piece of work.

Cases of suspected plagiarism in assessed work are investigated under the disciplinary regulations concerning conduct in examinations. Intentional or reckless plagiarism may incur severe penalties, including failure of your degree or expulsion from the university.

What forms can plagiarism take?

- Verbatim quotation of other people's intellectual work without clear acknowledgement. Quotations must always be identified as such by the use of either quotation marks or indentation, with adequate citation. It must always be apparent to the reader which parts are your own independent work and where you have drawn on someone else's ideas and language.

- Paraphrasing the work of others by altering a few words and changing their order, or by closely following the structure of their argument, is plagiarism because you are deriving your words and ideas from their work without giving due acknowledgement. Even if you include a reference to the original author in your own text you are still creating a misleading impression that the paraphrased wording is entirely your own. It is better to write a brief summary of the author's overall argument in your own words than to paraphrase particular sections of his or her writing. This will ensure you have a genuine grasp of the argument and will avoid the difficulty of paraphrasing without plagiarising. You must also properly attribute all material you derive from lectures.

- Cutting and pasting from the Internet. Information derived from the Internet must be adequately referenced and included in the bibliography. It is important to evaluate carefully all material found on the Internet, as it is less likely to have been through the same process of scholarly peer review as published sources.

- Collusion. This can involve unauthorised collaboration between students, failure to attribute assistance received, or failure to follow precisely regulations on group work projects. It is your responsibility to ensure that you are entirely clear about the extent of collaboration permitted, and which parts of the work must be your own.

- Inaccurate citation. It is important to cite correctly, according to the conventions of your discipline. Additionally, you should not include anything in a footnote or bibliography that you have not actually consulted. If you cannot gain access to a primary source you must make it clear in your citation that your knowledge of the work has been derived from a secondary text (e.g. Bradshaw, D. Title of Book, discussed in Wilson, E., Title of Book (London, 2004), p. 189). For more guidance on how to reference correctly, see http://www.cs.ox.ac.uk/files/3161/Referencing.pdf

- Failure to acknowledge. You must clearly acknowledge all assistance which has contributed to the production of your work, such as advice from fellow students, laboratory technicians, and other external sources. This need not apply to the assistance provided by your tutor or supervisor, nor to ordinary proofreading, but it is necessary to acknowledge other guidance which leads to substantive changes of content or approach.

- Professional agencies. You should neither make use of professional agencies in the production of your work nor submit material which has been written

for you. It is vital to your intellectual training and development that you should undertake the research process unaided.

- Autoplagiarism. You must not submit work for assessment which you have already submitted (partially or in full) to fulfil the requirements of another degree course or examination.

The necessity to reference applies not only to text, but also to other media, such as computer code, illustrations, graphs etc. It applies equally to published text drawn from books and journals, and to unpublished text, whether from lecture handouts, theses or other students' essays. You must also attribute text or other resources downloaded from web sites.

Why should you avoid plagiarism?
Students' work is expected to meet high academic standards and will be scrutinised carefully. The University must ensure that these standards and academic integrity are upheld. Plagiarism at this level is a serious breach of academic integrity and the consequences can be severe. In some cases a student may be expelled, or they may be stripped of their degree if their work is later discovered to contain plagiarised material. Some academics' careers have been ruined by the discovery of plagiarism in decades-old published work.

Far from being simply a disciplinary matter, plagiarism undermines the central tenets of scholarly discourse. Knowledge develops via a cumulative process as a result of years of research, innovation and debate. It is a principle of intellectual honesty that all members of the academic community should acknowledge their debt to the originators of the ideas, words, and data which form the basis for their own work. It is important to recognise that academic texts are multi-voiced, constructed from references to other texts; it is your responsibility as a writer to make it clear at all times whose 'voice' is speaking, whether your own or one of your sources'. This requirement for transparency of source use means that you must cite adequately, make it clear when you are quoting or paraphrasing, and establish the relationship between your source and your own text.

Citation
Giving credit to the authors of the ideas and interpretations you cite not only accords recognition to their labours, but also provides a solid theoretical basis for your own argument. Your ideas will gain credence if they are supported by the work of respected writers. Transparent source use allows you to situate your work within the debates in your field, and to demonstrate the ways in which your work is original. It also gives your reader the opportunity to pursue a topic further, or to check the validity of your interpretations.

When writing you should consider the ways in which your work depends upon or develops from other research, then signal this with appropriate citation. Make clear your reasons for citing a source. When paraphrasing an idea or interpretation you

must ensure that your writing is not too closely derived from the original, and you must also acknowledge the original author.

You may wish to employ software which keeps track of your sources and automatically formats the footnotes and bibliography (e.g. EndNote, Reference Manager, ProCite). It is important to be meticulous when taking notes: include full citation details for all the sources you consult and remember to record relevant page numbers. It is far too time-consuming to go back to your books to find page numbers or citation details later. Citation practice varies but, depending on the type of text cited (book, chapter in an edited volume, conference paper, journal article, e-print, etc.), the elements of a reference include: author; title of the book or article; title of the journal or other work; name of the conference; place of publication; date of publication; page numbers; URL; date accessed. The conventions for citing web resources vary between disciplines. You should note as many essential items of information as possible, such as author, title, publisher, dates of publication and last revision, URL, and date of last access. When using e-print archives you should bear in mind that many contain articles which have not yet been submitted for peer review. It is good practice to review the later, published versions for important changes before submitting your dissertation.

Patchwriting

Inexperienced writers, particularly those who are not native speakers of English, often develop their writing technique via a process known as “patchwriting”. If they lack the requisite skills of academic writing or self-expression, they may copy or heavily paraphrase their source material. Where the derivation is not made clear, this is plagiarism. However, it is recognised that many honest students employ mimicry and borrowed language as they learn to write in the academic style, and that patchwriting can be seen as a developmental stage. As students gain more experience at writing they must develop an independent voice and cease to rely on imitation. If work containing unattributed paraphrase is submitted for assessment, it will be treated as plagiarism regardless of the author's intentions.

Cultural differences

Students who experience difficulties adapting to the culture of academic study at Oxford should not delay in seeking out sources of support and guidance. If you are not a native English speaker, you should take full advantage of the resources at the Language Centre. Do not hesitate to approach your tutor to discuss your needs. Develop your academic writing skills through practice and ask for detailed feedback on your work. Ensure that you follow scrupulously the source use and referencing conventions of your discipline, even if they vary from those you have used before. You should take the online plagiarism course as early as possible to ensure that you understand the issues involved. This web site and the sites it links to will also provide useful resources. If you have specific difficulties or questions, you should always ask for advice.

Disciplinary process

Plagiarism in the work you submit for assessment is considered to be a breach of the disciplinary regulations regarding conduct in examinations. Full details of the disciplinary process are available on the university web site.

A last word

Not only is plagiarism unethical, it also seriously undermines the value of your work and of any degree you may obtain. By extension, it devalues the work of your colleagues and the standards of your institution. It can also have far-reaching consequences, the effects of which may be felt many years hence.

However, you should not avoid plagiarism for fear of disciplinary consequences, but because you aspire to produce work of the highest quality. Once you have grasped the principles of source use and citation, you should find it relatively straightforward to steer clear of plagiarism. Moreover, you will reap the additional benefits of improvements to both the lucidity and quality of your writing. It is important to appreciate that mastery of the techniques of academic writing is not merely a practical skill, but one that lends both credibility and authority to your work, and demonstrates your commitment to the principle of intellectual honesty in scholarship.

A guide to citing and referencing for students can be found on the Computer Science website.

[B] Applying for Computer Resources

The Department of Computer Science network connects around 70 servers, several hundred workstations (mostly running Linux, but also dual boot with Windows XP), various supercomputers, and many other machines. Facilities elsewhere are accessed via fast connections to the Internet. Details of the facilities available on the network may be obtained from any of the department's Computing Officers or on the web at **https://wiki.cs.ox.ac.uk/wiki/support**

To use the computing facilities on the department's own network please complete the Application for Computer Resources form included in your induction pack, and bring it to one of the practical sessions arranged for your course during first week. You will then be issued with a username and password.

If this is not possible, please consult the IT Support team, support@cs.ox.ac.uk.

The use of the department's facilities based in the Thom Building is governed by the rules of the Department of Engineering Science (as they apply to the Thom Building) and by the rules of the Department of Computer Science (as they apply to use of practical facilities). You must comply with any such rules which are brought to your attention. The University has issued a policy on data protection and computer misuse which you should read and take note of. **By signing the application form you are agreeing that you will not misuse any of the resources.**

The University has formal policies and guidelines which govern the use and misuse of Computers and Networks. In addition to this, members of the Department of Computer Science are expected as a matter of honour to respect the privacy of other users of the networks to which they have access, and to refrain from actions which will cause others' work to be damaged or delayed.

The General Data Protection Regulation (GDPR)

The General Data Protection Regulation (GDPR) from 2018 defines "personal data" as data which "any information relating to an identifiable living individual who can be identified from that data or from that data and other data;"

The University has issued a statement on its Data Protection Policy, and you are requested to read and take note of this. By signing the application form you are agreeing that you will not misuse personal data. If you are in any doubt about this, or other aspects of data protection, you should contact the support staff.

Declaration

This is a copy of the declaration which each student who requires computing facilities is asked by the Department of Computer Science to sign:

> I accept that all software systems and software packages used by me are to be regarded as covered by software licence agreement, with which I agree to abide, which unless specifically stating otherwise will prohibit me from

making copies of the software or transferring copies of the software to anyone else, other than for security purposes, or from using the software or any of its components as the basis of a commercial product or in any other way for commercial gain. I indemnify the Chancellor, Masters and Scholars of the University of Oxford, and the Oxford University Department of Computer Science, for any liability resulting from my breach of any such software licence agreement.

I will not use personal data as defined by the Data Protection Act on computing facilities made available to me in respect of this application other than in the course of my work as per the University's registration. I accept that the Oxford University Department of Computer Science reserve the right to examine material on or connected to any of their facilities when it becomes necessary for the proper conduct of those facilities or to meet legal requirements and to dispose of any material associated with this application for access to its resources upon termination or expiry of that authorisation.

I agree to abide by any code of conduct relating to the systems I use and the University policy on data protection and computer misuse. In particular, I will not (by any wilful or deliberate act) jeopardise or corrupt, or attempt to jeopardise or corrupt, the integrity of the computing equipment, its system programs or other stored information, nor act in any way which leads to or could be expected to lead to the disruption of the approved work of other authorised users.

Other Notes

These notes are to help you to interpret the Application for Computer Resources form. If you need any additional help or information, please contact the support staff at the Department of Computer Science, Wolfson Building, Parks Road, *support@cs.ox.ac.uk*

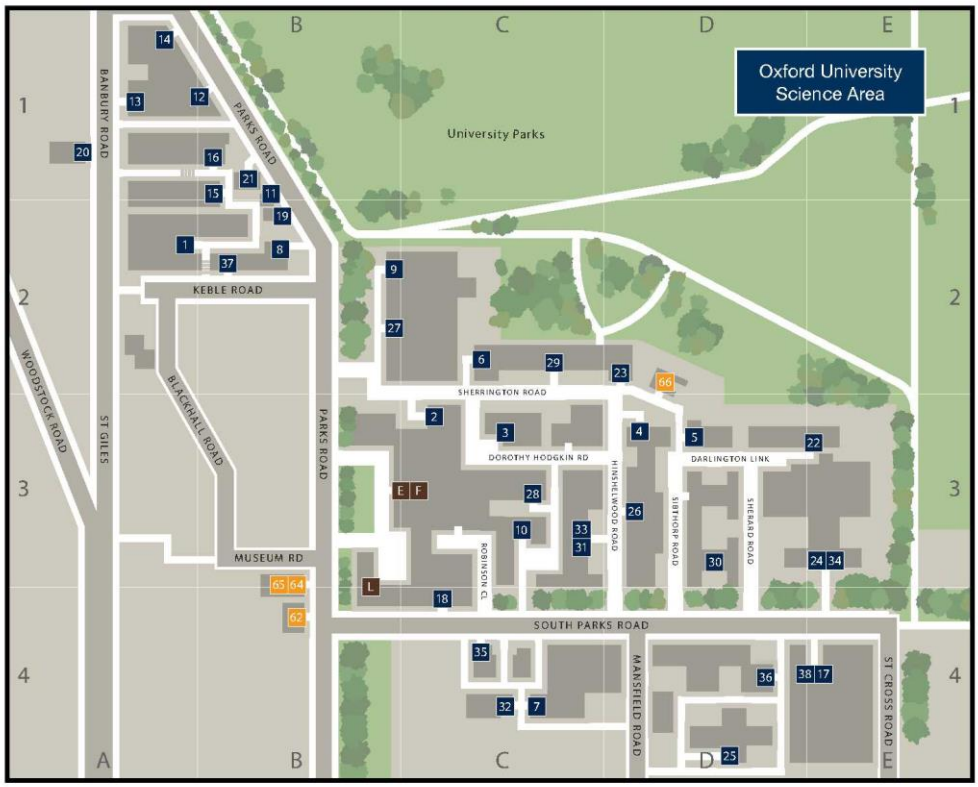
Nobody may use the resources of the Department of Computer Science without signing an application form, nor continue to do so once their account has expired. Queries about the conditions imposed by particular software licence agreements should be addressed to the support staff.

Referenced documents are available at or based upon:

https://www.it.ox.ac.uk/welcome/computer-usage-rules-and-etiquette
(Oxford University Computer Usage Rules and Etiquette)

https://www.eugdpr.org/
(General Data Protection Regulation)

[C] Map



Departments

1 Astrophysics, Particle Physics A2
2 Atmospheric, Oceanic & Planetary Physics C3
3 Biochemistry
BIOCHEMISTRY BUILDING C3
4 Biochemistry
RAY RICHARDS BUILDING D3
5 Biochemistry
RODNEY PORTER BUILDING D3
6 Burdon Sanderson Cardiac Science Centre C2
7 Chemistry C4
8 Computer Science B2
9 Condensed Matter Physics, Atomic & Laser Physics B2
10 Earth Sciences C3

Engineering Science:
11 14–15 PARKS ROAD B1
12 ENGINEERING AND TECHNOLOGY B1
13 INFORMATION ENGINEERING A1
14 JENKIN BUILDING A1
15 THOM BUILDING B1

16 Engineering Science, Materials
HOLDER BUILDING B1
17 Experimental Psychology E4
18 Inorganic Chemistry C4
19 Materials
12–13 PARKS ROAD B2
20 Materials
21 BANBURY ROAD A1
21 Materials
HUME-ROTHERY BUILDING B1
22 Medical Sciences Teaching Centre E3
23 Oxford Centre for Gene Function D2
24 Oxford Molecular Pathology Institute (OMPI) E3
25 Pharmacology D4
26 Physical & Theoretical Chemistry D3
27 Physics B2
28 Physiology, Anatomy & Genetics
LE GROS CLARK BUILDING C3
29 Physiology, Anatomy & Genetics
SHERRINGTON BUILDING C2
30 Plant Sciences D3
31 Research Laboratory for Archaeology & the History of Art C3
32 Rothermere American Institute C4
33 School of Geography & the Environment C3
34 Sir William Dunn School of Pathology E3
35 Statistics C4
36 The Peter Medawar Building for Pathogen Research D4
37 Theoretical Physics B2
38 Zoology E4

Administration and Services

62 Mathematical, Physical and Life Sciences Divisional Office
9 PARKS ROAD C3
64 Occupational Health Service
10 PARKS ROAD C3
65 Safety Office
10 PARKS ROAD C3
66 Security Services
THE OBSERVATORY, 10 SOUTH PARKS ROAD C4

University Museums

E Oxford University Museum of Natural History
PARKS ROAD C4
F Pitt Rivers Museum
SOUTH PARKS ROAD C4

University Libraries

L Radcliffe Science Library
PARKS ROAD C4