



HANDBOOK FOR THE  
UNDERGRADUATE  
MATHEMATICS  
COURSES

ISSUED OCTOBER 2013

## The Mathematical Institute

Mathematics is central to our understanding of the world in which we live, to our control of our environment, and to the organisation of our society. It underpins science, technology, medicine, economics and government. The preservation and propagation of mathematics is essential if civilization is to flourish. But this is a requirement that goes far beyond the simple recording and transmission of techniques of calculation and analysis. If society is to benefit from mathematics, it must nurture a mathematical culture by promoting a pervasive understanding of logical and mathematical ways of thinking and by supporting the study of mathematics for its own sake.

At every level, those who teach mathematics must be able to see beyond the horizons set by the problems at hand so that they may comprehend the concepts and aims of mathematics and not just simply mechanical execution. Without a broader appreciation of their subject, they will not pass on the understanding that is required for tackling new problems, nor will they instil a sense of the beauty and universality of mathematical ideas.

The mission of the Mathematical Institute is the preservation and expansion of mathematical culture. Our goals are to extend our own horizons through research at the highest level; to support the propagation and exploitation of mathematical ideas through publication and by reaching out to the public; to train our students, graduate and undergraduate, in the practice of mathematics; and to educate them in the ways of mathematical thinking. By these means, and by teaching those who will themselves carry forward our mission, we seek to extend the benefits of mathematical understanding.

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## 1 Using this Handbook

This **Handbook** is intended as a guide and reference for you throughout your Mathematics course at Oxford. The information is for students matriculating in October 2013. Please keep it as a handy reference guide. It will be useful for you at the start of each year and when you are planning some reading over the summer (the Long Vacation) for your following year.

It supplements the material printed in the **Examination Regulations**. The **Handbook**, read in conjunction with its supplements, defines the syllabus, provides you with information to help you understand the processes and procedures of the Mathematical Institute, and the other facilities such as libraries and computers to which you have access. It gives you information on how you will be assessed and how your examinations are classified. You are supplied with the **Handbook** at the beginning of your course and will be informed by your tutors when you should collect supplements, including the **Synopses of Lecture Courses** for each year of your course. All this material is also published on the Mathematical Institute website.

The **Handbook** also gives you some information about how colleges work in relation to your Mathematics course. Your college tutors will give you more detailed information about the support provided within the tutorial system.

This is primarily the Course Handbook for the single subject Mathematics courses. Much of what is said is also relevant to the Mathematics parts of the joint courses (Mathematics & Computer Science, Mathematics & Philosophy and Mathematics & Statistics). However, students on the joint courses should also consult the handbooks designed specifically for those courses. The handbook, and other information about the Mathematics & Computer Science course, can be found on the Department of Computer Science website. The handbook, and other information about the Mathematics & Philosophy course, can be found on the Mathematical Institute website. The handbook, and other information about the Mathematics & Statistics course, can be found on the Statistics Department website.

## Other Important Documents

General regulations for the examination structure and conduct are published by the University in the **Examination Regulations**, known as ‘The Grey Book’. The information is also available online at <http://www.admin.ox.ac.uk/examregs/> and

[http://www.ox.ac.uk/students/examinations\\_assessments/](http://www.ox.ac.uk/students/examinations_assessments/).

If any information in the **Examination Regulations** affecting you is changed you will be informed. However, there is a convention that the syllabus cannot be changed to your disadvantage once you have started studying for the examination concerned, provided you take your examinations at the normal times.

At the start of each year the Mathematics Department produces the syllabi for the coming year’s examinations and synopses of lectures. The syllabi are the content on which examinations may be set; the synopses state the intended content of lecture courses but lecturers may include extra material enhancing the syllabus but which is not examinable. For Prelims, a formal syllabus giving the examinable content is published. For Parts A, B and C the syllabi are defined by the synopses. At the induction session new students will be provided with hard copy of the Prelims syllabi and synopses of lectures. It is also available online at

<http://www.maths.ox.ac.uk/current-students/undergraduates/handbooks-synopses/>  
as are the syllabi and synopses for latter parts of the course. Any student may obtain a printed copy of this information on request from the Reception at the Mathematical Institute. Please note, recommended reading is included with synopses.

In addition, guides to certain other courses, for example the first-year **Computational Mathematics** course, will be provided. Copies of **examination papers** from previous years are available from the departmental website. Older papers may be obtained from the **Examination Schools** but those recent papers more relevant to you can be accessed online at

<http://www.maths.ox.ac.uk/current-students/undergraduates/examinations/past-papers/>

Previous papers provide useful practice questions but please note that previous papers will often be set on different syllabi and you will need to be guided to relevant questions by your tutors. Students will find past papers most valuable when used in conjunction with corresponding examiners' reports which are posted online at <http://www.oxam.ox.ac.uk>.

In addition to subject specific guides, you will receive other information about your college's regulations and requirements and more generally, **Essential Information for Students** (the Proctors' and Assessors' Memorandum, which is also available online at <http://www.admin.ox.ac.uk/proctors/info/index.shtml>). **Lecture lists** giving titles, times and places of lectures for Mathematics courses are available online at

<http://www.maths.ox.ac.uk/notices/lecture-lists/>

## 2 Your First Weeks at Oxford University

Many of you will already have read 'How do Undergraduates do Mathematics?' prepared by Professor Charles Batty with the assistance of Professor Nick Woodhouse. If you have not done so, then it is available online at

<http://www.maths.ox.ac.uk/files/study-guide/index.shtml>

and you are strongly recommended to read it as part of the induction to your course.

The Department Induction session is held at 2pm on Friday Week 0 in the Mathematical Institute, lecture theatre 1, at which you will be given final documentation for your course. Further useful information can be found at

<http://www.maths.ox.ac.uk/current-students/undergraduates/making-most-your-degree>

The Oxford mathematics students have also developed a useful "Guide to Freshers" and website (<http://people.maths.ox.ac.uk/~murc/>). This guide is produced by students and you may find it helpful to read their briefer more informal view on what you need to know at the beginning of your course.

### Email

You will be allocated a college email account. Important information about your course will be sent to this account. If you do not plan to access it regularly then you should arrange for mail to be forwarded to an account which you do read regularly. You are asked to bear in mind that lost email is the students' responsibility should they choose to forward email to a system outside the university.

For remote access to the University's restricted site you will need to use the University's VPN service. See the Maths Institute's IT Notices page

<http://www.maths.ox.ac.uk/help/faqs/undergrads>

## Useful ‘Web’ addresses

Mathematical Institute

<http://www.maths.ox.ac.uk/>

Statistics Department

<http://www.stats.ox.ac.uk/>

Department of Computer Science

<http://www.cs.ox.ac.uk/>

Faculty of Philosophy

<http://www.philosophy.ox.ac.uk/>

Lecture timetables

<http://www.maths.ox.ac.uk/notices/lecture-lists/>

Information about remote access to the University restricted pages (VPN service)

<http://www.maths.ox.ac.uk/help/faqs/undergrads>

Archive of past exam papers 2000–2013

<http://www.oxam.ox.ac.uk/>

Unofficial archive of past exam papers 1991–2013

<http://www.maths.ox.ac.uk/current-students/undergraduates/examinations/past-papers>

Examiners’ reports 2000-2013

<http://www.maths.ox.ac.uk/notices/exam-reports/>

*How do Undergraduates do Mathematics?* Notes by Charles Batty

<http://www.maths.ox.ac.uk/files/study-guide/index.shtml>

*Information on the Joint Consultative Committee for Undergraduates*

<http://www.maths.ox.ac.uk/current-students/undergraduates/jccu>

*Webpage for MMathPhys in Mathematical and Theoretical Physics*

<http://www-thphys.physics.ox.ac.uk/MMathPhys>

## General

Comments or suggestions for matters which might be amended or which might usefully be covered in subsequent editions of this booklet would be welcome. They should be sent to the Director of Undergraduate Studies in the Mathematical Institute, or emailed to [academic.administrator@maths.ox.ac.uk](mailto:academic.administrator@maths.ox.ac.uk).

If you require this handbook in a different format, please contact the Academic Administrator in the Mathematical Institute: [academic.administrator@maths.ox.ac.uk](mailto:academic.administrator@maths.ox.ac.uk) or (6)15203.



## 3 The Mathematics Courses

### 3.1 Aims and Structure

#### 3.1.1 The Courses

The University offers two single-subject courses in Mathematics, and seven joint courses:

<b>MMath</b>	Mathematics	4-year
<b>BA</b>	Mathematics	3-year
<b>MMathCompSci</b>	Mathematics & Computer Science	4-year
<b>BA</b>	Mathematics & Computer Science	3-year
<b>MMathPhil</b>	Mathematics & Philosophy	4-year
<b>BA</b>	Mathematics & Philosophy	3-year
<b>MMath</b>	Mathematics & Statistics	4-year
<b>BA</b>	Mathematics & Statistics	3-year
<b>MMathPhys</b>	Mathematical & Theoretical Physics	4-year

#### 3.1.2 Overall Course Structure

The degree programmes listed in 3.1.1 are structured so as to share certain lectures and supporting classes, and to share certain examination papers. The first-year courses, in particular, have been constructed so that it is sometimes possible to move from one course to another. Such a change needs the permission of your college, and if you think you may want to change course you should consult your college tutor as soon as possible (see 3.5 Exit Points).

There are formal University examinations at the end of the first, second, third, and (where relevant) the fourth year of the course. (As mathematics is a progressive subject, later examinations, by implication, cover earlier core work.)

The first year examination is called the **Preliminary Examination**, usually just referred to as 'Prelims', the second-year examination is called **Part A**, the third-year examination is called **Part B** and the fourth-year examination is called **Part C**.

Teaching is normally through structured lecture courses supported by classes or tutorials, and, where appropriate, practical work. In the third and fourth years, there may be some reading courses involving prescribed reading and group meetings.

Assessment is normally by written examination. However, some units are assessed by coursework for which projects or extended essays are submitted. Further details can be found in the supplements you will receive as you progress through each year of the course. If you want to look ahead, the current supplements are available online.

## 3.2 Background

Oxford University is a large collegiate university, with over 22,000 students including around 12,000 undergraduates and 10,000 postgraduates.

### 3.2.1 Some Facts and Figures

The following facts about the Mathematics students may be of interest:

- offers made for October 2013 were 252; being 179 for the single subject courses, 29 for *Mathematics & Computer Science*, 17 for *Mathematics & Philosophy*, 27 for *Mathematics and Statistics*
- of these 184 were men and 68 women.
- the last-examined fourth year numbered 173 ; being 118 in *Mathematics*, 11 in *Mathematics & Computer Science*, 21 in *Mathematics & Philosophy* and 23 in *Mathematics & Statistics*;
- students are carefully selected for the degrees taking into account the admissions test, interviews, references; there are also a great many support structures in the Collegiate University concerning academic and general welfare; consequently few drop out of the degree or fail, almost none later than the first year;
- for degree results please see sections 7.5.2 and 7.5.3;
- the most recent available results on first employment for mathematics students can be found at <http://www.maths.ox.ac.uk/node/7077>

### 3.2.2 Academic Staff

Most established Mathematics University postholders are based in the Mathematical Institute, the Department of Statistics, or the Department of Computer Science; a few are also in Philosophy, Social Studies, and Physics.

The most recent research ratings (the 2008 ‘RAE’) showed that Oxford mathematicians were assessed extremely highly with a significant percentage of faculty with internationally renowned reputations. Averaged across the three disciplines of Pure Mathematics, Applied Mathematics and Statistics, Oxford ranked first in the UK.

### 3.2.3 The Departments

#### The Mathematical Institute

The Mathematical Institute is a focus for mathematical activity in Oxford. The members of the Mathematical Institute include more than 200 graduate students as well as professors, readers, other members of staff and academic visitors. There are currently 16 statutory chairs held in the department, with 8 statutory chairs in Pure Mathematics and 8 statutory chairs in Applied Mathematics though many other academics hold the title of Professor. The Mathematical Institute, as the mathematics department is known, incorporates the Oxford Centre for Industrial and Applied Mathematics, as well as the Centre for Mathematical Biology and the newly established Oxford Centre for Collaborative Applied Mathematics. Whilst it is usual for mathematics departments in Britain to be split into departments of Pure and Applied Mathematics, the unitary Oxford structure, which encourages numerous strong interactions between the different groups, is regarded as a major factor in the continued high reputation enjoyed by Oxford Mathematics.

Research is carried out in a wide variety of fields including algebraic, differential and general topology, group theory, representation theory and other branches of algebra, number theory, mathematical logic, functional analysis, harmonic analysis, algebraic and differential geometry, differential equations, probability theory and its applications, combinatorial theory, global analysis, mathematical modelling, financial mathematics, stochastic analysis, mathematical biology, ecology and epidemiology, continuum mechanics, elasticity, applied and fluid mechanics, magnetohydrodynamics and plasmas, atomic and molecular structure,

quantum theory and field theory, relativity and mathematical physics, applied analysis, materials science and numerical analysis.

You may find out more about the Institute by visiting the department's website:  
<http://www.maths.ox.ac.uk/>.

### **The Department of Statistics**

The Department of Statistics provides a focus for Statistics within the University, and has numerous links with outside scientific and industrial concerns, especially in the area of genetics. In the last RAE (2008) the Statistics Department was comfortably rated first in the UK for its research.

You may find out more about the Department by visiting the website:  
<http://www.stats.ox.ac.uk/>.

### **Department of Computer Science**

The Department of Computer Science is a leading centre for the study, development and exploitation of computing technology.

You may find out more about the Department by visiting the website:  
<http://www.cs.ox.ac.uk/>.

### 3.3 The First Year

The first year course is run as a joint venture with the Statistics Department. The official first year syllabus for the Preliminary Examination for 2013/14 is in a separate booklet which will be supplied together with this handbook at the induction session. Lecture synopses are included in this additional booklet. The lecture courses form a co-ordinated programme, ensuring full and careful coverage, avoiding unnecessary duplication to help you prepare for the examinations. Reading lists are given alongside the synopses.

#### 3.3.1 The Lecture Courses

The lecture courses in the first year are as follows:

##### Michaelmas Term

Introduction to University Mathematics	8 lectures
Introduction to Complex Numbers	2 lectures
Linear Algebra I	14 lectures
Analysis I	14 lectures
Introductory Calculus	16 lectures
Probability	16 lectures
Geometry	7 lectures
Dynamics I	8 lectures

##### Hilary Term

Linear Algebra II	8 lectures
Groups and Group Actions	8 lectures
Analysis II	16 lectures
Statistics	8 lectures
Dynamics II	8 lectures
Fourier Series and Partial Differential Equations	16 lectures
Multivariable Calculus	16 lectures

##### Trinity Term

Groups and Group Actions	8 lectures
Analysis III	8 lectures
Optimisation	8 lectures
Constructive Mathematics	8 lectures
Applications	8 lectures

#### 3.3.2 The Computational Mathematics Course

In addition to the written papers for Prelims, students reading Mathematics or Mathematics & Statistics are required to follow a compulsory computing course “Computational Mathematics”. This course has been devised to acquaint mathematicians with the use of computers as an aid to learning about mathematics, and to give access to a useful mathematical software package. Please refer to the course handbook for further information.

The course is computer-based and currently uses the MATLAB software. Students may access the system through college or individual computers; for the former they should consult the computing support at their own college. MATLAB may be installed and used

on personally-owned computers under the University's site license. Further details on how to install MATLAB are available at <http://www.maths.ox.ac.uk/help/software/matlab>

Practicals are held in the Mathematical Institute and students will need to bring a laptop. To save time, students are asked to install MATLAB on their personal laptop prior to the first session. Students who do not have their own laptop will be able to borrow one for the practicals from the Institute, please contact Nia Roderick, Academic Assistant ([roderick@maths.ox.ac.uk](mailto:roderick@maths.ox.ac.uk))

The course is divided into two parts, one part in each of Michaelmas and Hilary Terms. The Michaelmas Term work consists of preparatory work. Four practicals of two hours each are timetabled.

In Hilary Term you work on two projects. The marks are communicated to the Moderators, who will take them into account. Candidates shall only be deemed to have passed the Preliminary Examination if they have satisfied the Moderators in all five examination papers *and the practical assessment*.

It is important to observe the deadlines for submitting your Computational Mathematics projects. Failure to meet the deadlines may mean that the work will not be taken into account. For 2013/14 the deadlines are:

- **1st project: 12 noon on Monday of week 6, Hilary Term**
- **2nd project: 12 noon on Monday of week 9, Hilary Term**

Students transferring into Mathematics from any other subject will still be expected to submit two projects (but may be granted extensions to deadlines).

These must be your own unaided work; you will be asked to make a declaration to this effect when you submit them. The University and Mathematical Institute regard plagiarism as a serious issue. Any attempt to submit another's work as your own or to make use of published sources without explicit reference to them will be regarded as an infringement of University's code concerning academic integrity. Your attention is drawn to the *Proctors' and Assessor's Memorandum*, Section 9.5, "Conduct in Examinations" which covers all forms of assessment. See also **Section 8.3** for further information.

Candidates who miss the above deadlines may ask their college to apply to the Chairman of Mathematics for permission to submit late. Where there is a valid reason, the Chairman would normally approve the late submission without penalty. Where it is deemed that there is no valid reason the Chairman of Mathematics will advise the Moderators to apply a penalty of at least 5% of the marks.

### 3.3.3 Changing Course

Your college will have admitted you to study a particular course and you will need their permission to change course, this includes changing between single subject and joint Mathematics courses. You may be given permission to change without taking an extra year. This is usually only possible during the first year of the course. If given permission then you will need to catch up the relevant missed work.

## 3.4 The Second, Third and Fourth Years

In the second, third and fourth year of your course many options are available. These vary a little from year to year depending on faculty interests and current research interests. The

lists in the following sections show the options available in the academic year 2013-14. You will receive information on the options, year by year, when it becomes available.

### 3.4.1 The Second Year (Part A)

The second year course consists of three compulsory subjects (core material) lecture in Michaelmas Term;

Algebra I - Linear Algebra (16 lectures),  
Differential Equations I (16 lectures),  
Metric Spaces and Complex Analysis (32 lectures)

followed by a number of *long options* (16 lectures each) in Michaelmas or Hilary Term:

Algebra II - Rings and Modules,  
Integration,  
Topology,  
Differential Equations II,  
Numerical Analysis.  
Probability (MT),  
Statistics,  
Waves and Fluids,  
Quantum Theory (MT)

and *short options* (8 lectures each) in Trinity Term:

Algebra III - Group Theory,  
Calculus of Variations,  
Graph Theory,  
Multivariate Differentiation,  
Number Theory,  
Projective Geometry,  
Special Relativity.

The compulsory core is studied in Michaelmas Term, alongside some options. The options are mostly studied in Hilary, and the first half of Trinity Term. Each candidate shall be required to offer 8 written examination papers. These will include 2 papers on the core subjects, 5 papers from the long options and 1 paper on the short options (of which students are recommended to take three in Trinity Term).

The Mathematical Institute is responsible for the delivery of all units except for those on Probability and Statistics, which are the responsibility of the Department of Statistics.

### 3.4.2 The Third and Fourth years (Parts B and C)

A student will take the equivalent of eight 16-hour units in the third year of either H or M level; those continuing to the fourth year will be expected to take the equivalent of eight M level 16-hour units in that year.

Units are designated either as H-level (aimed at the third year undergraduates) or M-level (aimed primarily at the fourth year or M.Sc. students).

### 3.4.3 Mathematical and Theoretical Physics (MMathPhys)

From the academic year 2015/16, Oxford Physics and Oxford Mathematics will jointly offer a new masters level course in Mathematical and Theoretical Physics. Oxford MPhys, MMath or MPhysPhil students will be able to apply for transfer to the MMathPhys mode of the course after their third year and study mathematical and theoretical physics in their fourth year, instead of following the fourth year of their original degree course. Students from outside Oxford can join the MSc mode. The MMathPhys course provides a high-level, internationally competitive training in mathematical and theoretical physics, right up to the level of modern research. It covers the three main areas

- Theoretical Particle Physics.
- Theoretical Condensed Matter Physics.
- Theoretical Astrophysics, Plasma Physics and Physics of Continuous Media.

The programme offers considerable flexibility and freedom to design individual pathways. For example, students can aim for a broad theoretical education across subject areas or, alternatively, focus on one of the three subject areas above. Studies can be pursued with stronger emphasis on mathematical or on physical aspects.

MMathPhys students will graduate with a Master of Mathematical and Theoretical Physics with a double classification, a BA degree class for the first three years of their study in their original subject and a MMathPhys degree class for their fourth year. For full details see the course website <http://www-thphys.physics.ox.ac.uk/MMathPhys>.

### 3.4.4 Pathways

Formal details of which combinations of units you may offer in the examinations will be published by the University in the **Examination Regulations**. The **lecture synopses** will describe recommended ‘background courses’. It should be noted that you may choose a course even though you have not done the background courses, but the lecturers and examiners will lecture and examine on the basis that you have the background. If you wish to take a course and you have not taken the recommended background courses then you are advised to consult your college tutors who may be able to help and advise you on background reading.

### 3.4.5 Making Choices

Your college tutors will be able to give you advice. Some preliminary work in the libraries, looking at the books recommended in the **reading lists** may also help. **Past papers**, and **examiners’ reports** may give some of the flavour. When making your choice you should consider not only options which you find interesting and attractive, but also the terms in which lectures and classes are held. Ideally your work in Michaelmas and Hilary Terms should be spread evenly. Below we give the lists of Part B and C options delivered in 2013-14. We anticipate those available when you come to your third and fourth years will be broadly similar.

## Part B Units in 2013-14

**Mathematics Department Units** (Courses are units unless otherwise stated.)

- B1a Logic — MT
- B1b Set Theory — HT
- B2a Introduction to Representation Theory — MT
- B2b Group Theory and an Introduction to Character Theory — HT
- B3a Geometry of Surfaces — MT
- B3b Algebraic Curves — HT
- B3.1a Topology and Groups — MT
- B4a Banach Spaces — MT
- B4b Hilbert Spaces — HT (cannot be taken unless B4a is taken)
- B568a Introduction to Applied Mathematics — MT (6 lectures, prerequisite for B5, B6 and B8)
- B5a Techniques of Applied Mathematics — MT
- B5b Applied Partial Differential Equations — HT
- B5.1a Dynamical Systems and Energy Minimization — MT
- B6a Viscous Flow — MT
- B6b Waves and Compressible Flow — HT
- B7.1a Quantum Mechanics — MT
- C7.1b Quantum Theory and Quantum Computers — HT (cannot be taken unless B7.1a is taken)
- B7.2b Special Relativity and Electromagnetism — HT (cannot be taken unless B7.1a is taken)
- B8a Mathematical Ecology and Biology — MT
- B8b Nonlinear Systems — HT
- B9a Galois Theory — MT
- B9b Algebraic Number Theory — HT (cannot be taken unless B9a is taken)
- B10a Martingales Through Measure Theory — MT
- B10b Continuous Martingales and Stochastic Calculus — HT
- B10.1b Mathematical Models of Financial Derivatives — HT



- B11a Communication Theory — MT
- B11b Graph Theory — HT
- B12a Applied Probability — MT
- B21a Numerical Solution of Differential Equations I — MT
- B21b Numerical Solutions of Differential Equations II — HT
- B22a Integer Programming — MT
- BE “Mathematical” Extended Essay MT & HT (double unit)
- BSP Structured project (Mathematical Modelling and Numerical Computation) — MT & HT (double unit)

### **Other Mathematical Units**

- O1 History of Mathematics — MT & HT (double unit)
- OE “Other Mathematical” Extended Essay MT & HT (double unit)
- Statistics Units
  - OBS1 Applied Statistics — MT & HT (double unit)
  - OBS2a Statistical Inference — MT
  - OBS3b Statistical Lifetime Models (can only be taken as a double unit with B12a) — HT
  - OBS4a Actuarial Science I — MT
  - OBS4b Actuarial Science II — HT (can only be taken as a double unit with OBS4a)
- Computer Science Units
  - OCS3a Lambda Calculus and Types — MT
  - OCS4b Computational Complexity — HT

### **Other Non-Mathematical Units**

- Education Units
  - N1b Undergraduate Ambassador’s Scheme — mainly HT
- Philosophy Units
  - N102 Knowledge and Reality MT & HT (double unit)
  - N122 Philosophy of Mathematics MT & HT (double unit)
  - N101 History of Philosophy from Descartes to Kant MT & HT (double unit)

**Language Classes: French and Spanish** (Please contact the Academic Administrator for details, [academic.administrator@maths.ox.ac.uk](mailto:academic.administrator@maths.ox.ac.uk)).

**Part C Units in 2013-14** (Courses are units unless otherwise stated.) **Mathematics**

**Department Units**

- C1.1a Model Theory — MT
- C1.1b Gödel's Incompleteness Theorems — HT
- C1.2a Analytic Topology — MT
- C1.2b Axiomatic Set Theory — HT
- C2.1a Lie Algebras — MT
- C2.1b Representation Theory of Symmetric Groups — HT
- C2.2a Commutative Algebra — MT
- C2.2b Homological Algebra — HT
- C2.3b Infinite Groups — HT
- C3.1a Algebraic Topology — MT
- C3.2b Geometric Group Theory — HT
- C3.3b Differentiable Manifolds — HT
- C3.4a Algebraic Geometry — MT
- C3.4b Lie Groups — HT
- C4.1a Functional Analysis — MT
- C4.1b Linear Operators — HT
- C5.1a Methods of Functional Analysis for Partial Differential Equations — MT
- C5.1b Fixed Point Methods for Nonlinear Partial Differential Equations — HT
- C5.2b Calculus of Variations — HT
- C5.3b Hyperbolic Equations — HT
- C6.1a Solid Mechanics — MT
- C6.1b Elasticity and Plasticity — HT
- C6.2a Statistical Mechanics — MT
- C6.2b Networks — HT
- C6.3a Perturbation Methods — MT
- C6.3b Applied Complex Variables — HT
- C6.4a Topics in Fluid Mechanics — MT

- C6.4b Stochastic Modelling of Biological Processes — HT
- C6.5b Mathematical Mechanical Biology — HT
- C7.1b Quantum Theory and Quantum Computers — HT
- C7.2a General Relativity I — MT
- C7.2b General Relativity II — HT
- C7.4 Theoretical Physics — (double unit)
- C8.1a Mathematical Geoscience — MT
- C8.1b Mathematical Physiology — HT
- C9.1a Modular Forms — MT
- C9.1b Elliptic Curves — HT
- C9.2a Analytic Number Theory — MT
- C10.1a Stochastic Differential Equations — MT
- C10.1b Brownian Motion and Conformal Invariance — HT
- C11.1a Combinatorics — MT
- C11.1b Probabilistic Combinatorics — HT
- C12.1a Numerical Linear Algebra — MT
- C12.1b Continuous Optimization — HT
- C12.2a Approximation of Functions — MT
- C12.2b Finite Element Methods for Partial Differential Equations — HT
- CD Dissertations on a Mathematical Topic — (unit or double unit)

### **Other Mathematics Units**

- Statistics Units
  - MS1b Statistical Data Mining and Machine Learning — HT
  - MS2b Stochastic Models in Mathematical Genetics — MT
  - MS5a Probability and Statistics for Network Analysis — MT
  - MS6a Modern Survival Analysis — MT
  - MS6b Advanced Simulation Methods — HT
- Computer Science Units

- CCS1a Categories, Proofs and Processes — MT
- CCS3b Quantum Computer Science — HT
- CCS4b Automata, Logics and Games — HT

### Other Non-Mathematical Units

- Philosophy
  - Rise of Modern Logic — MT (double unit)
- Dissertation
  - OD Dissertations on a Mathematically related Topic — (unit or double unit)

**Language Classes: French and Spanish** (Please contact the Academic Administrator for details, [academic.administrator@maths.ox.ac.uk](mailto:academic.administrator@maths.ox.ac.uk))

## 3.5 Exit points

We hope, and expect, that you will enjoy studying Mathematics at Oxford and will successfully complete your degree. A high proportion of those admitted to read Mathematics elect to stay for 4 years to complete the MMath; of the remainder, almost all obtain the B.A. in Mathematics after 3 years. A very few students will opt to switch to another Oxford course or, exceptionally, to a course at another university.

### 3.5.1 Three years or four years?

The choice of which degree you take will be based on your interests and aptitudes, your performance in the first three years and your career intentions. You may wish to discuss your decision with your college tutors, who will be able to advise you on which course is more appropriate for you. **Undergraduates will need to achieve overall a 2.1 or better in their second and third year exams to progress to Part C.**

By default, all students are registered for the MMath. If you subsequently decide to take the B.A. option you must inform your college office who will in turn inform the central administration and the departments. You will be asked to confirm on your Part B Examination entry form whether or not you intend to stay for the fourth year. The decision you declare at this point is not immutable, but should be final if at all possible, and you are strongly advised to take a final decision before the start of your Part B examinations.

Please ensure that you have consulted your college tutor(s) before making your decision. It is important that your college knows your intentions as early as possible in order to plan for the following year. You are therefore requested to notify your college, either yourself or through your tutor, of your intentions, and to keep the college fully informed if these subsequently change.

It could happen that, having embarked upon your fourth year, you are for whatever reason unable to complete the Part C course, or decide that you do not wish to do so. In these circumstances you are advised to discuss your situation with your college's Senior Tutor at the earliest opportunity.

### 3.5.2 Changing course

We very much hope, and in the great majority of cases can confidently expect, that you will do well in this course and benefit from your studies. At the same time, you should not feel that your original choice is irrevocable if it is not turning out as you had anticipated. In any degree course, a very few who embark upon it may come to feel it is not the right course for them. Mathematics is no exception and a few students doing the course change to another. (Also a few doing some other course change to Mathematics).

If you are feeling you should change, the first thing is to be patient for a while. You may be finding the course difficult but this is natural enough and your tutors are there to help you with difficulties. Seek their advice, and maybe discuss your problems with your contemporaries: you are not in competition with them, and you should get into the habit of helping and being helped. Nevertheless you may continue to feel that the course is not right for you.

If you are considering changing from Mathematics to another Oxford course, the possibilities are to change to a course joint with Mathematics, or to an entirely different course. This last is the most radical and its feasibility depends on particular interests, background and circumstances. The first is more generally feasible. You will find it helpful to talk to fellow students on the course or courses to which you might like to change and to consult the University Prospectus and course documentation available on the web. Normally your college will have admitted you to read for a specific undergraduate degree (consisting of the sequence of First Public Examination followed by Final Honour School). If you wish to explore the possibility of changing course, first talk to one of your current tutors or, if that is embarrassing, to the Senior Tutor or to someone else in your college with responsibility for academic welfare of students. After that, talk to tutors in the subject to which you wish to change.

If you have already made a substantial start on your course then it is likely that your tutors will advise you to stay with it until you have completed your First Public Examination. By proceeding in this way you may be able to change course without losing a year, since you must pass a First Public Examination in some course or other before you can proceed to any Final Honour School and any First Public Examination counts as a qualification for any Final Honour School. (The only undergraduates eligible for exemption from the requirement to pass a First Public Examination before entering for an Honour School are those who have already obtained a degree at another university.)

#### **Changing to another course joint with Mathematics**

If you are considering changing to a Mathematics joint course before Prelims, then you need to be aware that you will need to catch up on course work in the other subject. To change to a joint Mathematics course after Prelims will involve studying over the summer some of the material examined in the second discipline. Your tutors will advise you what to concentrate on.

#### **Changing to another Oxford course: the formalities**

If you decide you do want to change course, there are three bodies that must approve: your college, the University, and those who are paying for you. Permission from your college will be needed for change to another course. This is liable to be refused if the receiving tutors think you unsuited to their course, or don't have room. The University is unlikely to be

a problem. It accepts for any examination all candidates who are suitably qualified and supported by their colleges. However, a few departments do have quotas for acceptance on to the courses taught in them.

See below as regards financial issues in connection with a change of course.

## **Moving to another university**

The most radical (and rare) change is to decide to study at another university, either because the course you realise you want to do isn't offered by Oxford, or because you feel that you will do better somewhere else. Before deciding to pursue such a step be sure to get lots of advice, both from tutors and from family and friends. If in the end it seems a good idea, you should be able to ask your college to support your application for a place at another university.

### **3.5.3 Financial issues**

Please be aware that any change to your choice of degree may impact on your level of maintenance funding and the time taken to receive your student loan. You are advised to contact Student Finance,

<https://www.gov.uk/student-finance>

for further enquiries.

If you have financial support for your studies from an award, scholarship, or sponsorship, this is likely to be on the basis of the specific course you are pursuing, in which case permission from your funding body to change course, even within Oxford, will be required if this support is to continue. You will need to ask your Senior Tutor to write to your funding body to certify that you have been given permission to change course.

The MMath is recognized as a masters-level qualification. For students not classified as Overseas, there may be adverse financial consequences in taking the MMath (rather than the B.A.) if they wish thereafter to take another masters-level Taught Course. This arises because of ELQ (Equivalent or Lower Qualifications) fee liabilities: universities do not receive any government funding for ELQ students and consequently adopt a special ELQ fees rate, which is likely to be roughly double that of the standard fee for graduate taught courses. Information can be found at

<http://www.admin.ox.ac.uk/studentfunding/fees/feerates/elq.shtml> .

## **3.6 The Long Vacation**

### **3.6.1 Summer Projects**

Various bursaries become available each year supporting undergraduates in project work during the long vacations in Oxford. More typically (but not solely) these are in areas associated with Applied Mathematics, Statistics and Computer Science and are usually aimed at students at the end of their third or fourth years. What is offered varies from year to year; usually the Department's Academic Administration team will circulate details of these opportunities by email.

Details of these opportunities will also be posted on

<https://www.maths.ox.ac.uk/current-students/undergraduates/projects>.

## 4 Teaching and Learning

### 4.1 An Average Week

Typically your tutors will be expecting you to work **around 40 hours per week** during term time. This may vary a little from week-to-week, depending on how you are finding the material. Also many of these hours are *flexitime*, meaning that you will be free to follow other pursuits providing that you put the hours in elsewhere during the week.

Of these 40 or so hours, around 10 will be **lectures**, and around 2-3 will be on **tutorials** or **classes**. This means that there is a good deal of time (25+ hours) that is unassigned, to be filled by your own independent study.

It is important that you quickly get into a mode of learning that suits you. In an effort to help structure this independent study, the (first year) lecturers produce five weekly exercise sheets (one per two lectures) that will form the basis of tutorials. This means that roughly 5 hours should be assigned to each sheet. (From the second year onwards there will be one sheet per four lectures so you should be spending closer to 10 hours per sheet.)

Success on the course is not simply a matter of completing these sheets. The problems will be chosen as a guide to what you need to know and to demonstrate how the material hangs together: these are their aims. To those ends you will no doubt wish to review your lecture notes and to appreciate the importance of the main theory and the tools and methods to hand. Some of the exercises you may find routine and quickly solve; others will take longer to crack, perhaps only at your third or fourth attempt. Do not be surprised if some of the final questions prove too difficult to complete, but you should have attempted everything. Ultimately the problems you have had (in general or with specific problems) will be addressed in the next tutorial.

So the main ingredient for success in mathematics at university is committed independent study. It is the breaking down of subtle analytical problems yourself, the appreciation of how method and theory connect, the necessary organisation and perseverance that the course requires, which ultimately make our students successful academics or sought-after employees more widely.

### 4.2 Lectures and how to get the best out of them

All official lectures are advertised in the termly **lecture list** for Mathematical Sciences. Students can download the lecture list from

<http://www.maths.ox.ac.uk/notices/lecture-lists>

In addition, each week's timetable with details of lecture rooms is posted on the electronic notice board in the Mathematical Institute. All Mathematics lectures for first years are now held in the Mathematical Institute.

Lectures are usually timetabled to last an hour but there is a convention for undergraduate lectures to commence a few minutes after the hour and likewise finish a few minutes before the hour to allow for students to move in and out of the room. For the first two years, students will attend around 10 hours of lectures a week and around 8 hours weekly in the fourth year.

Lectures are a traditional way of presenting material at university level; they are an integral part of learning at university but will no doubt prove a rather unfamiliar means of communicating mathematics initially. They demand a mature, disciplined, motivated audience. For mathematics, they are a particularly important, intense and effective way of conveying information. A course of lectures might be thought of as learning to find your

way around a new town. For most people the most effective way to familiarise themselves is to have a guided tour by someone who already knows the main features and how to get to them. A tour might be quite fast and miss some things out so that you need to go again relatively soon afterwards to see if you can find the way yourself. Similarly with lectures you will not take not in everything first time around and you will need to do further work yourself to gain a complete understanding. Revisiting the material you may find connections of your own in amongst the theory they way a second tour might lead you down side alleys that the first tour necessarily omitted. But without lectures it is hard to get started and very hard to gain a full understanding. The lecturer knows the important facts and theorems and can lead you along a path which includes the background necessary to understand and appreciate the results as they unfold. Most mathematicians find it easier to learn from lectures than books.

Unsurprisingly different lecturers have different styles and in any case different topics in Mathematics warrant different treatments. You will find that some lecturers produce lecture notes which are posted online, but it is still usually a good idea to take your own notes, so that you stay attentive during the lecture and more closely pay attention to how one line of an argument or calculation follows from another. Notetaking itself is a valuable transferable skill to acquire. Afterwards be sure to file neatly your lecture notes (together with tutorial notes, problem sheets, your marked solutions, etc.) so that they can be easily referenced afterwards, especially during periods revising for examinations.

Practically, then, how do lectures fit into the process of learning and understanding mathematics? Even if you are reasonably on top of the material that has been discussed in previous lectures (re-reading beforehand the earlier material will help if not, and remind you of definitions and notation) you will likely find the pace of the lecture and the high-level nature of the material a little too intense to take absolutely everything in. So, for your understanding to cohere, you will need to revisit the material by re-reading the lecture notes and by doing the problem sheets that the lecturer (or possibly your tutor) has set. More to follow on that! But one thing to be sure of mathematics is a serial subject. Try not to fall behind with a topic: if you miss a lecture, quickly get a copy of the notes; if a course has not gone well during the term, spend some extra time over the vacation catching up. As John von Neumann famously once said: "in mathematics, you don't understand things. You just get used to them." He was probably being a little facetious, but it is the case that the mathematics you meet in your first year, complicated though it may seem now, will appear rather routine a year later (probably in less time than that) and it is only by repeatedly familiarising yourself with its ways and patterns that this will become so.

### 4.3 Problem Sheets

All lectures in Mathematics are supported by **problem sheets** compiled by the lecturers. These are available for downloading from the Mathematical Institute website. Most students prefer to print their own copies, although they can be printed by the department by prior arrangement. Many college tutors use these problems for their tutorials; others prefer to make up their own problem sheets. In Part B and Part C, problem sheets will be used for the intercollegiate classes run in conjunction with the lectures.

Many of the books recommended in the **reading lists** contain exercises and worked examples; **past papers** and **specimen papers** are another source of such material, useful for revision.

Problem sheets tend to start with straightforward examples, checking your understand-



ing of an important theorem or a standard technique, but usually they progress on to trickier exercises that really test and probe your understanding of the material. It is *not* a good idea to start the problem sheet by looking at a problem and then simply searching the lecture notes for a bit that resembles the exercise. The lecture material usually represents a coherent piece of theory and it is a good idea to have some sense of this (its motivation and internal logic) *before* starting the problem sheets. Similarly the exercise will likely involve some technical language: if your sense of any of these technical terms is fuzzy or half-remembered then revisit your lecture notes (or text) and look up the *precise* definition before proceeding. A well set exercise will often crack just as a chunk of the theory comes into place; it will usually take a few tries though before the harder exercises are resolved (if at all).

#### 4.4 Tutorials

To support lectures in the 1st and 2nd years, colleges arrange tutorials and classes for their students. How these are organised will vary from college to college and subject to subject. For example, in your first and second years you might have two (one-hour) tutorials each week, with between one or two other students. Consequently it is a highly individual and flexible way of teaching and tutorial groups are usually arranged to include students that work well together and, perhaps, who are progressing academically at about the same rate.

You will be set some work for each tutorial and in the tutorial you will discuss the work and be able to ask about any difficulties you have experienced. In order to get the best out of a tutorial, it is important that you are well prepared and also that you see the tutorial as an opportunity to get resolved all the problems that you have encountered that week – to that end you may well want to make a list during the week of queries to be raised in the tutorial. A tutorial is, after all, a hour with an expert in that area. Your tutor is unlikely to give up the answer to your question immediately and may respond with hints or questions of his/her own to that end – but this is all towards improving your understanding of the material and showing you how you might have made further progress with the problem yourself.

#### 4.5 Classes

Each 16-hour lecture unit in the subjects of Parts B and C will be supported by classes run under the Intercollegiate Class Scheme. Students generally attend four  $1\frac{1}{2}$ -hours classes (or equivalent) for each Part B and Part C unit.

Each class will usually consist of between five and twelve students from a number of different colleges and is run by a class tutor and a teaching assistant. The course lecturer provides suitable **problem sheets**, and also provides specimen solutions for the class tutors and teaching assistants. Students hand in their solutions in advance and these are marked by the teaching assistants; at each class, some of the problems are discussed in detail, and there is an opportunity to ask the class tutor and teaching assistant about any particular difficulties. The class tutors report to colleges through the intercollegiate class database on your performance throughout the term. Consultation sessions to help with revision are run during Trinity term.

There are Options Fairs run in the Mathematical Institute towards the end of Trinity Term – at the end of your second year for Part B and at the end of your third year for Part C – where representatives from the different subject groups will discuss the individual

options and be available to answer any questions you may have.

## 4.6 Practicals

For some of the units there is a component of compulsory practical work. Arrangements will be explained by the course lecturer; your college tutor will also advise. Those who run the practical sessions will also give advice on how the work is to be written-up.

## 4.7 Feedback

There is plenty of opportunity, both formal and informal, for you to comment on the course. The informal ways are through the members of the Faculty who teach you in classes, lectures and tutorials, and also through your personal tutors in college. All of these members of the Faculty 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.

Written questionnaires are handed out by each lecturer, who will give time during a lecture for their completion. A similar monitoring of the intercollegiate classes takes place termly.

Once the termly questionnaire results are processed, each course lecturer receives the comments and statistical analysis from their own course and in addition consolidated information is made available to relevant committees for discussion, and where necessary, action. One of the key committees to consider this information is the *Joint Consultative Committee for Undergraduates*, (JCCU) and the action taken as a result of questionnaire comments is made known to your representatives through this channel. This Committee deals with matters over the whole range of Mathematics, Computer Science and Statistics courses.

All input from undergraduates about the course content, structure and facilities generally is welcomed by the Department and taken seriously. A specimen questionnaire form can be downloaded from the web at

<https://www.maths.ox.ac.uk/current-students/undergraduates/forms>

We also have some formal channels of communication with undergraduates. When the Director of Undergraduate Studies or the Department wishes to consult the undergraduate body about policies or inform you of action taken following requests from the JCCU, you will be notified via e-mail. Further, minutes of the JCCU meetings taken by your student representatives, reports and feedback on student requests can also be found here. See

<http://www.maths.ox.ac.uk/current-students/undergraduates/jccu>.

Students are also surveyed once a year for all aspects of their course (learning, living, pastoral support, college) through the Student Barometer. Previous results can be viewed online <http://www.ox.ac.uk/students/living/surveys/> Undergraduate students will also be surveyed instead in their final year through the National Student Survey. Results from previous NSS can be found at <http://www.unistats.com/>

## 4.8 History of Mathematics

You are encouraged to read around your subject, and it can be very beneficial to look through texts, other than the main recommended text(s), to see a treatment of the material other than your lecturer's and tutor's. College libraries will usually have such texts so this should not cost you extra.

It can also help to have a sense of the subject's history and development. There is a *History of Mathematics* option in the third year, but otherwise you will find (because of time constraints) that lecturers largely focus on teaching the syllabus and have little time to comment on historical sidelines, to discuss how the current material used to be treated or even what problems initially motivated the topic. We include here a short list of books recommended by tutors, for you to dip into at various times during your time at Oxford.

H Dörrie, *100 Great Problems of Elementary Mathematics*, Dover (1965)

J Fauvel, R Flood & R Wilson, *Oxford figures: 800 years of the mathematical sciences*, OUP (2000)

E M Fellmann, *Leonhard Euler*, Birkhäuser (2007)

M Kline, *Mathematics in Western Culture*, Penguin (1972)

M Kline, *Mathematical Thought from Ancient to Modern Times*, OUP (1972)

V Katz, *A History of Mathematics: An Introduction* Second Edition, Addison-Wesley (1998)

J Stillwell *Mathematics and Its History* Third Edition, Springer (2010)

D Struik, *A Concise History of Mathematics*, Dover Paperback, (1946)

#### 4.9 Special Educational Needs

A student with a disability or special needs which affects his or her ability to take notes of lectures should contact the Disabilities Service, college tutor and the Academic Administrator at the Mathematical Institute. See also the departmental Disability Statement at Appendix F

## 5 Resources

### 5.1 Books

A complete set of lecture notes should not be viewed as your sole source of information for a course. If you have found the course relatively straightforward then they may prove sufficient, though that is not to say you couldn't benefit from other texts and further reading, but if the course has gone less well then you would certainly be wise to consult other texts in the college library (or sources on the internet) for more examples and other treatments of the material. Access to other mathematical texts and sources will help in clarifying points made in lectures, completing arguments given partially, doing things in different ways, and so on. **Reading lists** are issued alongside the **lecture synopses** and are revised annually. They contain a range of suggestions, including alternatives and suggestions for further reading.

To make best use of a book, it is easiest to have your own copy so think seriously of buying some texts – your tutor will be able to advise you on which to buy. Often you will be able to buy such books from your predecessors in your college, or through the virtual second-hand Bookstall run by MURC. Second-hand copies are also available in Blackwell's second-hand department but they sell out rapidly. Amazon also sells second-hand books.

### 5.2 Libraries

The main source of borrowed books is your **College Library**. College libraries generally purchase the books which appear in the **reading lists** for every Prelims, Part A and Part B course, and many Part C courses. In practice, college libraries also provide a good selection of the books listed as 'further reading', and, indeed, a wider selection of background and alternative reading, some of which have gone out of print.

Many college libraries have a number of copies of key books and are usually responsive to requests for new purchases, but *they need to be asked*. The colleges have various mechanisms for these requests; again your college tutor will be able to advise you.

The other source of books to borrow is the **Radcliffe Science Library** in Parks Road. This library is associated with the **Bodleian** and as an undergraduate you are entitled to use it. When you arrive in Oxford you will be given a combined reader's card/University Card which you should carry with you. This will give you access to any part of the **Bodleian Library** and any of its dependent libraries.

### 5.3 IT

The University is committed to making available computer facilities sufficient to cover the course-work requirements of undergraduates.

All students will be automatically allocated a University email account and may register for further services at Oxford University Computing Services. (See §5.4.1 below). A number of important notices will be sent to you via email. **It is important to check your email account frequently.**

Colleges have PCs (and in some cases Macs), mostly networked, for the use of junior members. Many college students' rooms are wired with ethernet points to enable students to connect their own PCs to the network. There is a concern for computer security and anyone opening an account must agree to abide by the University's rules. At Oxford there is a University disciplinary procedure for enforcing the rules, and breaches of them will

involve the Proctors with all the sanctions and penalties available to them.

**Some University webpages are NOT available from outside the Oxford network. But if you are regularly using a computer outside the Oxford network, you need to set up VPN. Instructions on how to do this can be found at:**

<http://www.maths.ox.ac.uk/help/faqs/undergrads>

## 5.4 Other

### 5.4.1 IT Services

Your computing requirements will be supported primarily by the departmental and college IT staff; certain facilities of the central computing services are available when appropriate.

*Oxford University Computing Services* (part of *IT Services*) are located at 13 Banbury Road and offer facilities, training and advice to members of the University in all aspects of academic computing. The central services are based on a number of main computer systems together with core networks reaching all departments and colleges. You can find more information at

<http://www.it.ox.ac.uk/> and <http://www.oucs.ox.ac.uk/>

### 5.4.2 The Language Centre

The *Language Centre* provides resources and services for members of the University who need foreign languages for their study, research or for personal interest, and also to improve English language skills.

Language courses in eight languages, the Language Library (consisting of over 13,000 audio and video cassettes with accompanying textbooks in over 100 languages) and its study area (computer-based learning resources and audio/video study rooms) are available free of charge to junior members of the University pursuing a course. Those in possession of a University Card must present it when they register at the Centre. You can find more information at <http://www.lang.ox.ac.uk/>

There may be an opportunity (as there has been in recent years) for Mathematics and joint schools students who have studied some French, German or Spanish to take a course in the third or fourth year. This will not count towards your degree class but you will receive a certificate upon passing the course.

### 5.4.3 Careers

Careers guidance is provided by the *Careers Service*, and at a personal level by college tutors. Careers advisers carry out guidance interviews with students, discussing with them their skills and aspirations. The Careers Service also provides training in writing applications, interview techniques and analysis of transferable skills. The Careers Service provides information about occupations and employers, and advertises work experience opportunities.

Members of the Faculty who have taught you are usually willing to provide support and references. The Careers Service provides a link-person, who has expertise in areas where mathematicians are often in demand, for example, in finance careers. College tutors are regularly updated on Careers Service activities.

In addition to its general programme, the Careers Service runs an annual ‘Jobs for Mathematicians’ half-day, in collaboration with the Mathematical Institute. At this event there are talks from alumni currently working in jobs suitable for mathematicians. The event also helps students consider their transferable skills. You can find more information at <http://www.careers.ox.ac.uk>.

The Mathematics Undergraduate Representation Committee (MURC) has set up an emailing list for careers and studentship information, to which you could sign up to. You can do this by sending a blank message to [murc-jobs-join@maths.ox.ac.uk](mailto:murc-jobs-join@maths.ox.ac.uk). The system will confirm your request and once that is completed you will be registered to receive careers information.

#### 5.4.4 University Lectures

University **lectures** in all subjects are open to all students. A consolidated **lecture list** is available on the University website at:

<http://www.ox.ac.uk/students/academic/lectures/>.

Seminars and colloquia given in the Mathematical Institute, often by mathematicians of international repute, are announced on the departmental notice boards; although usually aimed at faculty and research students, all interested in the subject are welcome to attend.

#### 5.4.5 Study Skills

Much of the advice and training in study skills will come in the regular tutorial and class teaching your college arranges for you. In these sessions, and in preparation for them, you will develop your powers of expression and argument. There is also good advice in Prof. Batty’s “How do Undergraduates do Mathematics?” available in paper copy from reception in the Mathematical Institute, and electronically on the website <http://www.maths.ox.ac.uk/files/study-guide/index.shtml>.

The *Projects Committee* gives guidance on the choice and preparation of extended essays and dissertations.

#### 5.4.6 Special Needs

Specialised advice and assistance is available for dyslexic, blind/partially sighted, and other disabled students from the University Disability Office on the web

<http://www.admin.ox.ac.uk/eop/>

or contact [disability@admin.ox.ac.uk](mailto:disability@admin.ox.ac.uk) or 01865 (2)80459.

If you experience difficulties with your course because of a disability then you should discuss this with your college tutors. Some colleges have a specific member of staff who assists students with welfare difficulties. Please also see the Mathematical Institute Departmental Disability Statement, in Appendix F.

## 6 Organisation and Representation

### 6.1 Mathematical, Physical & Life Sciences Division

The Mathematics, Statistics and Computer Science Departments are all part of the Mathematical, Physical & Life Sciences Division.

### 6.2 The Departments

Academic staff teaching undergraduate mathematics typically belong to one of three departments: the Mathematical Institute, the Department of Statistics, and the Department of Computer Science. These departments provide most of the rooms and resources for the courses.

The Mathematical Institute contains lecture theatres and seminar rooms in which undergraduate lectures and classes are given. Problem sheets may be downloaded from the Departments' websites, also some lecture notes, additionally copies of some lecture notes are sold at the Reception desk. Most matters concerned with the administration of the Mathematics courses are dealt with in the Institute – for example the production of synopses, lecture timetables and lecture notes. If you have any comments relating to departmental provision, please contact the Academic Administrator in the first instance (contact details in Appendix C.)

### 6.3 The Faculties

The University staff in each department, and main college teachers in the subject areas, are grouped together in a Faculty. The faculties provide a broad consultative framework which ensures that the views of all teaching staff are taken into account when decisions about admissions, syllabus, teaching and examining are made.

### 6.4 Colleges

Oxford University is a collegiate university. All undergraduates are members both of a college and the university. Courses, syllabi, lectures and examinations are organised and delivered by the university. Colleges are responsible for making undergraduate admissions to the university. They deliver tutorial and class teaching, and are generally responsible for the academic and personal well-being of their students.

In a college there will usually be two or more subject tutors to select students, deliver tutorial and class teaching and generally guide students through their studies. Usually at the beginning and end of each term, a student will meet their subject tutor(s) to discuss selection of options and to make and receive information on teaching arrangements, etc. Students will also be assigned personal tutors to whom they may turn for general advice. The personal tutor may be in the same subject as the student or another subject altogether. Colleges have other welfare officers to whom students may turn for advice. Students will be advised at the beginning of their studies how things are arranged in their individual colleges.

### 6.5 Invariants Society

The Oxford University Invariant Society, with website <http://users.ox.ac.uk/~invar/> is the undergraduate mathematical society. Its primary aim is to host weekly talks by notable

speakers, on a wide variety of mathematical subjects. The Invariants also host social events, a Christmas party and an annual formal dinner. Titles of talks previously given include: Mathematics, Magic and Electric Guitars; Juggling: theory and practice; Bells and Change Ringing. There are opportunities for members to give their own talks. Meetings are held on Tuesdays at 8.00 pm at the Mathematical Institute. Anyone interested should come to the first meeting (which is free) to find out more.

## 6.6 Representation

### 6.6.1 MURC

The Mathematics Undergraduate Representative Committee (informally known as MURC) is composed of students who represent the interests of Mathematics and joint school students. It consists of a representative from each college. It holds regular meetings to discuss issues connected with academic organisation of the course such as lectures, examinations and syllabus content. It is the forum which allows undergraduates, through their representatives, to raise issues connected with their courses. It is important for colleges to have a representative to the committee.

The views of this committee are channelled to the faculties and departments through the *Joint Consultative Committee with Undergraduates* (JCCU). The JCCU meets regularly once a term and discusses any matters that the MURC representatives wish to raise; in addition, it considers matters relating to the synopses and proposed changes of syllabus.

The membership of the JCCU consists of twelve members of MURC appointed by MURC and representatives of the Department of Mathematics, of Computer Science and of Statistics. The committee is usually chaired by the Director of Undergraduate Studies and the Secretary is an undergraduate member of the committee. The statistical feedback from the questionnaires is sent to a designated undergraduate member of MURC (the Questionnaire Representative) for consideration by MURC and it is also discussed by JCCU. This committee is available for consultation by the Departments and by the Divisional Board on any matter which relates to the undergraduate courses.

The Chairperson and Secretary of MURC may attend meetings of the Faculty of Mathematics, and the Chairperson may attend meetings of the Mathematics Teaching Committee.

### 6.6.2 MURC Activities and Facilities

The programme of MURC activities and facilities is displayed on the MURC notice board beside the Institute lecture rooms. Information can also be found on the MURC website, <http://www.maths.ox.ac.uk/~murc>

During the year, open days for prospective Mathematics students are run by the Mathematics Faculty in collaboration with MURC.

### 6.6.3 OUSU

Undergraduate representation at University (as opposed to subject or college) level is coordinated through *OUSU*, the Oxford University Student Union. Details of these arrangements can be found in **Essential Information for Students** (the **Proctors' and Assessor's Memorandum**). Contact details for OUSU can be found in Appendix C.



#### **6.6.4 College**

Most colleges have procedures in place for consultation, monitoring, and feedback. Your subject or personal tutors will be able to advise you on this.

#### **6.6.5 The Proctors and Academic Appeals**

In the rare case of any student wishing to make an appeal against an examination result, the appeal is made on their behalf by the college to the Proctors. Students should also be aware that they have the right to take certain other matters directly to the Proctors (see 8.1). Contact details can be found in Appendix C.

## 7 Assessment and Examinations

As well as a medium of instruction, the tutorial is a personally tailored form of continuous assessment, and both you and your tutor should have a good idea of how your studies are progressing. College tutors will also organise college examinations, called **collections**, from time to time, usually at the start of term. These are not to be confused with the University's **public** examinations which count towards you for your degree classification(s); rather they are a check on how you are progressing academically, to identify misunderstandings you may have with the material and for you to practise and improve your examination technique.

For the undergraduate degrees in Mathematics you will sit examinations each year in Trinity term, called **public examinations** because they are organised by the University, rather than privately by your college.

### 7.1 Preparation

Your tutors will advise you about revision and practice. As well as any consolidation work done after the end of term, it is usual to spend much of Trinity term revising work for the coming examinations.

In subjects which were taught in previous years, past examination papers are a good guide to the typical format and content of examination question. These can be found on the web at

<http://www.maths.ox.ac.uk/current-students/undergraduates/examinations/past-papers>

Please note that the syllabus for the examination may have changed, and is certainly not determined by what appeared in past papers. Your tutor will be able to give you advice on relevant questions.

### 7.2 Entering for University Examinations

In Year 1 examination entry is automatic once you register at the beginning of the year. Your college will ask you to register through the self-service *link* where you confirm all your personal details.

For each student a personal timetable of examinations will be issued and sent to the college a few weeks before the examination. This gives details of where and when each of the written papers for which you are entered will take place. Your college will pass on your timetable together with a randomly allocated **candidate number** which you will use to identify your scripts, instead of your name and college. You must take your candidate number to every examination you sit.

Before the examinations you will receive at least one **notice to candidates** from the examiners to give you the details of the examination procedure.

### 7.3 Procedure for Written Examinations

Typically, first and second year examinations are held at **Ewert House** in Summertown, with third and fourth year examinations in the **Examination Schools** on the High Street. When attending public examinations you must wear full academic dress (subfusc and gown) and carry your cap. You must bring your University Card with you.

Allow plenty of time to reach the examination room. Desks will be arranged in numerical order and seating charts will be displayed throughout the reception area as well as outside individual examination rooms and will show candidate and desk numbers. On reaching your

desk you should check that the correct question paper has been provided but should not open the paper until the invigilator declares the start of the examination. You **will need to know your candidate number** so that you can write it (and *not* your name) on your answer booklet.

You must write in ink, rather than pencil, though you may use pencil for any graphs and diagrams. You should begin each question in a new answer booklet and write your candidate number on each booklet. You should hand in your answer booklets in numerical order and write the numbers of all the questions to be marked on the front cover sheet. If you answer fewer than the required number of questions you must submit an empty answer booklet for each unanswered question so that you still submit the required number of answer booklets. You should cross out all rough working and any working you do not want to be marked. Booklets containing rough work should be handed in with your answer booklets.

General information for current students can be found on the Examinations and Assessment section of the University website <http://www.ox.ac.uk/students/exams/>

## 7.4 First Public Examination

At the end of the third term of the first year, both the three- and four-year courses have the same first year University examination, the Preliminary Examination in Mathematics. There are no lectures in the second half of this term to give you extra time to prepare for the examination. The examination consists of five papers, each of two and a half hours duration: Mathematics I, II, III, IV, V. Each paper has seven questions, and you will be instructed to submit answers to no more than five questions. No books or tables may be taken into the examination room. Calculators are not normally permitted and you should follow instructions in notices sent to you by the Chairman of Examiners regarding calculators. The Moderators (i.e the examiners) will also take into account the marks awarded for your work on the Computational Mathematics projects. The Moderators give **Advice to Candidates** on marking conventions and how they identify and reward excellence; see the Examination Conventions for more information.

### 7.4.1 Examination Results

The Preliminary Examination is unclassified, with candidates simply being awarded a Fail, Pass or Distinction. Previous to 2012 the examination at the end of Year 1 was Honour Moderations in which candidates were classified. The percentages in each category for recent years were:

	First	Second	Third	Pass	Honours (unclassified)	Fail
2011	32%	60%	5%	1%	0%	2%
2012	30%	63%	2%	0%	1%	4%
		Distinction	Pass	Partial Pass	Fail	
	2013	31%	58%	7%	4%	

### 7.4.2 Resits

Those who fail one of more of the Prelims papers in June, or who were unable to sit the examination because of illness or other urgent and reasonable cause, may enter for the Preliminary Examination in September (Resits). A candidate who failed one or two papers

will be required to resit and pass those papers only to progress to Part A; any candidate failing three or more papers will be required to resit all five papers.

## 7.5 Second Public Examination

### 7.5.1 Part A

The three- and four-year courses have the same University examinations Mathematics Part A, taken at the end of the third term of the second year. Part A is not classified, but the results will be carried forward to the classification awarded at the end of the third year (see below). The Part A papers should be completed before taking the Part B. Any deviation requires the approval of the Education Committee of the University. **In 2013-14 the Part A Examination will be in a different format to previous years.** In particular you should pay attention to differences with previous past papers; new sample questions will be set on material that is new to the second year.

### 7.5.2 Part B

At the end of the third term of your third year you will take Part B. The formal details of which combination of papers you may offer in the examination will be published by the University in the **Examination Regulations**. In total you must take the equivalent of eight units. The Examiners give **Advice to Candidates** on marking conventions, etc.

On the basis of your performance in the Parts A and B examinations (split 40:60 across the two years) you will be classified (First, Upper Second, Lower Second, Third Class) or given a Pass or failed. Recent statistics for the BA degree are:

	First	Upper Second	Lower Second	Third	Pass	Incomplete	Fail	Unclassified
2011	36.24%	44.3%	13.42%	4.70%	1.34%	0%	0%	0%
2012	34.3%	47.6%	12.7%	3.0%	1.8%	0%	0%	0.6%
2013	33.76%	49.68%	13.38%	1.27%	1.27%	0.64%	0%	0%

Please refer to <https://www.maths.ox.ac.uk/notices/exam-reports/> for further information.

### 7.5.3 Part C

If you take the MMath course, the second and third year will be very similar to the BA and you will take Parts A, B and C with Part C at the end of your fourth year. **Examination Regulations** and amendments published in the University Gazette will give full details. You will receive a class at the end of Part B (as above) and a separate class for Part C. Recent statistics for the MMath degree are:

	First	Upper Second	Lower Second	Third	Pass	Fail
2011	46.5%	36.6%	13.9%	1.0%	0.0%	2.0%
2012	45.5%	36.4%	15.1%	3.0%	0.0%	0.0%
2013	47.5%	34.7%	12.7%	3.4%	0.0%	1.7%

Please refer to <https://www.maths.ox.ac.uk/notices/exam-reports/> for further information.

#### 7.5.4 Examination Results

The Examiners will provide you with a *University Standardised Mark* (USM) for each unit. You will be able to access your results via the Student Self Service. The Academic and Assessment Results page within Student Self Service gives details of all your assessment results (examination papers and/or submissions) and the overall result for the year (if applicable).

#### 7.5.5 Repeats and Resits

For details of the regulations concerning repeats see the relevant sections of the **Examination Regulations**. Your college tutor will also be able to give advice about these infrequently used procedures.

### 7.6 Projects, Dissertations, Extended Essays

Third year students may write an extended essay or structured project each equivalent to a double unit or 32 lectures.

Fourth-year students may write a unit or a double-unit dissertation.

Projects give students the opportunity to develop valuable skills – collecting material, explaining it, expounding it clearly and persuasively, and using citations. Some students show their abilities better on a sustained piece of exposition rather than on solving problems set in a three-hour examination paper.

Note: further information may be found in project guidance notes

[http://www.admin.ox.ac.uk/examregs/08-16\\_Part\\_16\\_Marking\\_and\\_assessment.shtml](http://www.admin.ox.ac.uk/examregs/08-16_Part_16_Marking_and_assessment.shtml)

### 7.7 Examination Regulations

You should always check with the current **Examination Regulations** which can be consulted on the University website.

### 7.8 Prizes

The following prizes are available for undergraduate students. These are awarded by the Examiners, and no application is necessary.

#### Prelims

- Two IBM prizes of £250 each, are available for performance in Mathematics papers for candidates in the Preliminary Examination.

#### Part B

- Gibbs Prizes of £400 and a *proxime accessit* prize of £200 or two equal prizes of £300 at the discretion of the Examiners.
- Gibbs Mathematics Prize of £100 for Mathematics and Philosophy candidates for performance in Mathematics papers.

- Gibbs Mathematics Prize of £50 for Mathematics and Philosophy candidates for performance in Philosophy papers.
- 2 Junior Mathematical prizes of £200 each.
- IMA Prize of a year's free membership.

### **Part C**

- A single Gibbs Prize of £400 or two equal Gibbs Prizes of £200, at the discretion of the examiners.
- Gibbs Mathematics Prize of £100 for Mathematics and Philosophy candidates for performance in Mathematics papers.
- Gibbs Mathematics Prize of £50 for Mathematics and Philosophy candidates for performance in Philosophy papers.
- Junior Mathematical Prize of £100.
- IMA Prize of a year's free membership.
- Dissertation Prize: the examiners may award one or two prizes of £100 for the best dissertation

## 8 University Regulations and Codes

### 8.1 The Proctors

The following is quoted from **Essential Information for Students** (the **Proctors' and Assessor's Memorandum**):

“The Proctors and Assessor are available if students wish to consult them in confidence for help, information, or advice about University matters or any other matters outside the sphere of their college advisers. Such consultations may be on individual matters or on behalf of a club, society, or any other group of members of the University”.

The duties of the Proctors and Assessor are now mainly:

- ensuring that regulations designed to maintain the orderly working of the University are implemented (which means that they play a major part in seeing that University examinations are conducted properly and fairly, and in enforcing disciplinary regulations);
- investigating complaints by members of the University (the Proctors have the power to summon any member of the University before them to help in their enquiries);
- serving on a wide range of University committees (to assure themselves that the University's procedures are working satisfactorily).

### 8.2 Paperwork

The Proctors and Assessor have produced a booklet called **Essential Information for Students** which you will be given by your college. This contains general information about health and welfare matters; the Student Union; residence; sport and recreation; intellectual property; safety and security. It is a source of information about the University's academic support services including the University Language Centre and Careers Services. The booklet also gives the University's formal, statutory rules and requirements in relation to Conduct of Examinations, Harassment, Freedom of Speech and explains complaints and appeals procedures. It is important for you to read this booklet in conjunction with the **handbook** for your course.

An A to Z of University regulations, codes of conduct and policies is at <http://www.ox.ac.uk/students/academic/conduct>.

#### 8.2.1 Regulations for Candidates in University Examinations

Students should refer to the **Examination Regulations** for the full regulations regarding examinations. For example, Parts 9 - 18, and 20 relates to the conduct of examinations and Part 19 gives the *Proctorial's Disciplinary Regulation for Candidates in Examination*.

As stated in these regulations: (1) ‘**examination**’ includes where the context so permits the submission and assessment of a thesis, dissertation, essay, or other coursework which is not undertaken in formal examination conditions but counts towards or constitutes the work for a degree or other academic award; and (2) ‘**examination room**’ means any room designated by the Academic Registrar and Secretary of Faculties or approved by the Proctors as a place for one or more candidates to take an examination.

It is a student's responsibility to be aware of University guidance of these matters.

## 8.3 Plagiarism

The University and Department employ a series of sophisticated software applications to detect plagiarism in submitted examination work, both in terms of copying and collusion. It regularly monitors on-line essay banks, essay-writing services, and other potential sources of material. It reserves the right to check samples of submitted essays for plagiarism. Although the University strongly encourages the use of electronic resources by students in their academic work, any attempt to draw on third-party material without proper attribution may well attract severe disciplinary sanctions.

Below is the University definition of what constitutes Plagiarism. All cases would be regraded as a serious disciplinary matter and could result in your being suspended or being sent down.

### 8.3.1 What is plagiarism?

Plagiarism is the copying or paraphrasing of other peoples 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.

### 8.3.2 Why does plagiarism matter?

It would be wrong to describe plagiarism as only a minor form of cheating, or as merely a matter of academic etiquette. On the contrary, it is important to understand that plagiarism is a breach of academic integrity. It is a principle of intellectual honesty that all members of the academic community should acknowledge their debt to originators of the ideas, words, and data which are included in a piece of work. Passing off anothers work as your own is not only poor scholarship but also means that you have failed to complete the learning process. Deliberate plagiarism is unethical and can have serious consequences for your future career. It also undermines the standards of your institution and of the degrees it issues.

### 8.3.3 What forms can plagiarism take?

- **Verbatim quotation** of other peoples 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 elses 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 authors 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).
- **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.

#### 8.3.4 Not just printed text!

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.

All matters relating to plagiarism are taken very seriously and any breach will lead to a disciplinary matter.

See for example, The Proctors and Assessor booklet **Essential Information for Students** Section 9, also available on-line at <http://www.admin.ox.ac.uk/proctors/info/pam/section9.shtml>

## **8.4 Code on Harassment**

The Mathematical Institute has appointed two senior members who may be consulted in connection with the University's Code on Harassment. Details are posted in reception in The Mathematical Institute.

## **8.5 Disabilities and Equal Opportunities**

The University is committed to making arrangements where appropriate to enable students with disabilities to participate fully in student life. Please see the University's Equal Opportunities Statement below, and the Mathematics Departmental Disability Statement in Appendix F.

## **8.6 University Equal Opportunities Statement: students**

The University of Oxford and its colleges aim to provide education of excellent quality at undergraduate and postgraduate level for able students, whatever their background. In pursuit of this aim, the University is committed to using its best endeavours to ensure that all of its activities are governed by principles of equality of opportunity, and that all students are helped to achieve their full academic potential. This statement applies to recruitment and admissions, to the curriculum, teaching and assessment, to welfare and support services, and to staff development and training.

### **8.6.1 Recruitment and Admissions**

Decisions on admissions are based solely on the individual merits of each candidate, their suitability for the course they have applied to study (bearing in mind any requirements laid down by any professional body) assessed by the application of selection criteria appropriate to the course of study. Admissions procedures are kept under regular review to ensure compliance with this policy.

We seek to admit students of the highest academic potential. All colleges select students for admission without regard to marital status, race, gender, ethnic origin, colour, religion, sexual orientation, social background or other irrelevant distinction.

Applications from students with disabilities are considered on exactly the same academic grounds as those from other candidates. We are committed to making arrangements whenever practicable to enable such students to participate as fully as possible in student life. Details of these arrangements can be found in the University's Disability Statement, and information will be provided on request by colleges or by the University Disability Co-ordinator.

In order to widen access to Oxford, the University and colleges support schemes which work to encourage applicants from groups that are currently under-represented. The undergraduate Admissions Office can provide details of current schemes.

None of the above shall be taken to invalidate the need for financial guarantees where appropriate.

### **8.6.2 The curriculum, teaching and assessment**

Unfair discrimination based on individual characteristics (listed in the statement on recruitment and admissions above) will not be tolerated. University departments, faculties,

colleges and the central quality assurance bodies monitor the curriculum, teaching practice and assessment methods. Teaching and support staff have regard for the diverse needs, interests and backgrounds of their students in all their dealings with them.

### **8.6.3 Welfare and Support Services**

Colleges have the lead responsibility for student welfare and can provide details of arrangements made to support their students. The University, in addition, provides for all students who require such support:

- a counselling service;
- childcare advice;
- disability assessment and advice, and
- a harassment advisory service.

Further details of these services are included in the Proctors' and Assessor's handbook 'Essential Information for Students', which is updated annually.

### **8.6.4 Staff Development and Training**

The University, through its Institute for the Advancement of University Learning, will provide appropriate training programmes to support this equal opportunities statement.

### **8.6.5 Complaints**

A candidate for admission who considers that he or she has not been treated in accordance with this equal opportunities policy should raise this with the college concerned (or department in the case of graduate admission). Students in the course of their studies may use the student complaints procedure and should, in the first instance, lodge their complaint with the Proctors, who will advise on the procedure to be followed thereafter. The Committee on Diversity and Equal Opportunity monitors complaints made by students.

## **8.7 Safety**

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

They should also note that in the Institute accidents should be reported immediately to Reception, telephone 73525, who keep the accident book. There is a First Aid room located on the ground floor of the South wing. If you require access to this room please report to reception.

Each lecture theatre has its own regulations for procedures to be followed in the case of fire or other emergency; you are urged to familiarise yourself with the proper escape routes. The escape routes from the Mathematical Institute lecture and seminar rooms, where most of your lectures will be held, are set out in the emergency exit procedure which is displayed in the Mathematical Institute. In the case of evacuation of the lecture theatre give heed to the instructions of the lecturer.

## 9 Information for International Students

This is aimed at International students but in fact may be helpful to all students.

### 9.1 Contacts

International Students Advisory Service (tel:(2)70105)  
Examination Schools, High Street, Oxford  
email: [international.office@admin.ox.ac.uk](mailto:international.office@admin.ox.ac.uk), website: [www.admin.ox.ac.uk/io](http://www.admin.ox.ac.uk/io)

Oxford University Language Centre (tel:(2)83360)  
email: [admin@lang.ox.ac.uk](mailto:admin@lang.ox.ac.uk), website: [www.lang.ox.ac.uk](http://www.lang.ox.ac.uk)

Oxford University Student Union - International Students Officer  
email: [international@ousu.org](mailto:international@ousu.org)

### 9.2 Language Skills

It is important, for many international students, to continue to develop English language skills, both for academic studies in Oxford and future careers. Some students, at the beginning of their time in Oxford, find they need to translate academic material into their first language before it can be digested. Some even go so far as to read translations of recommended texts. Students should aim to reach the point where they can think about their subject and solve problems directly in English, without any translation. Students are encouraged to discuss their work, even work together with other students, and we recommend that such joint work is conducted in English.

Undergraduates may attend one of the courses organised by The Oxford University Language Centre and also use their library of independent learning materials. More generally, the mastery of English will improve with constant reading and social interaction in English.

## Part I

# Appendices

## A Aims of the Courses

The programme aims:

- to provide, within the supportive and stimulating environment of the collegiate university, a mathematical education of excellent quality through a course which attracts students of the highest mathematical potential;
- to provide a learning environment which, by drawing on the expertise and talent of the staff, both encourages and challenges the students (recognising their different needs, interests and aspirations) to reach their full potential, personally and academically;
- to provide students with a systematic understanding of core areas and some advanced topics in mathematics, an appreciation of its wide-ranging applications, and to offer the students a range of ways to develop their skills and knowledge;
- to lay the foundations for a wide choice of careers and the successful long-term pursuit of them, particularly careers requiring numeracy, modelling and problem-solving abilities;
- to lay the foundations for employment as specialist mathematicians or in research through the study in depth of some of a broad range of topics offered;

and for students taking the 4-year MMath (Hons):

- to provide the foundations for graduate study through a research degree at a leading university either in the UK or overseas.

## B The Joint Courses

### B.1 Mathematics & Statistics

This handbook applies to the first year in Mathematics and Statistics, which is shared with the single-subject degree. For other details about the course please see the separate handbook and Statistics Department website.

### B.2 Mathematics & Computer Science

*Mathematics & Computer Science* is a three-year or four-year course intended to equip the future computer scientist with the fundamental understanding and practical skills needed by potential leaders of a demanding profession.

For more details about this course please see the separate handbook and Department of Computer Science website (<http://www.cs.ox.ac.uk/>).

### **B.3 Mathematics & Philosophy**

*Mathematics & Philosophy* is a three-year or four-year course intended for those who would like to combine the development of their mathematical skills with the study of philosophy. There is a natural bridge in the philosophy of mathematics, as well as in logic. The latter has always been reckoned a part of philosophy, and over the last hundred years it has developed as a branch of mathematics.

For more details about this course please see the separate handbook available at <http://www.maths.ox.ac.uk/current-students/undergraduates/handbooks-synopses/mathsphil>.

### **B.4 Mathematical and Theoretical Physics**

From the academic year 2015/16, Oxford Physics and Oxford Mathematics will jointly offer a new masters level course in mathematical and theoretical physics. Oxford MPhys, MMath or MPhysPhil students will be able to apply for transfer to the MMathPhys mode of the course after their third year and study mathematical and theoretical physics in their fourth year, instead of following the fourth year of their original degree course. Students from outside Oxford can join the MSc mode. The MMathPhys course provides a high-level, internationally competitive training in mathematical and theoretical physics, right up to the level of modern research.

For more detail about this course please see the separate handbook and course website <http://www-thphys.physics.ox.ac.uk/MMathPhys>.

## **C Contact Points**

### **C.1 Mathematical Institute**

**Director of Undergraduate Studies** Dr Richard Earl (tel: (6)15202)  
email: [director-ugrad-studies@maths.ox.ac.uk](mailto:director-ugrad-studies@maths.ox.ac.uk)

**Faculty Chairman** Prof. Andrew Dancer (tel: (2)73532)  
email: [andrew.dancer@maths.ox.ac.uk](mailto:andrew.dancer@maths.ox.ac.uk)

**Academic Administrator** Mrs Charlotte Turner-Smith (tel: (6)15203)  
email: [turner-smith@maths.ox.ac.uk](mailto:turner-smith@maths.ox.ac.uk)

**Deputy Academic Administrator** Mrs Helen Lowe (tel: (6)15204)  
email: [loweh@maths.ox.ac.uk](mailto:loweh@maths.ox.ac.uk)

**Graduate Studies Assistant** Miss Sandy Patel (tel:(6)15208)  
email: [patels@maths.ox.ac.uk](mailto:patels@maths.ox.ac.uk)

**Academic Assistant** Mrs Vicky Archibald (tel:(6)15206)  
email: [archibald@maths.ox.ac.uk](mailto:archibald@maths.ox.ac.uk)

**Academic Assistant** Miss Nia Roderick (tel:(6)15205)  
email: [roderick@maths.ox.ac.uk](mailto:roderick@maths.ox.ac.uk)

**Academic Assistant** Miss Jessica Sheard (tel:(6)15210)  
email: [sheard@maths.ox.ac.uk](mailto:sheard@maths.ox.ac.uk)

### **C.2 Faculty of Statistics**

**Chairman of Academic Committee** Dr Neil Laws (tel: (2)72597)  
email: [laws@stats.ox.ac.uk](mailto:laws@stats.ox.ac.uk)

**Academic Administrator** Ms Jan Boylan (tel: (2)72860)  
email: [boylan@stats.ox.ac.uk](mailto:boylan@stats.ox.ac.uk)

### **C.3 Department of Computer Science**

**Chairman of Teaching Committee** Prof. Ian Horrocks (tel: (2)73939)  
email: [ian.horrocks@cs.ox.ac.uk](mailto:ian.horrocks@cs.ox.ac.uk)

**Academic Administrator (Maternity Cover)** Mrs Leanne Carveth (tel: (2)73833)  
email: [leanne.carveth@cs.ox.ac.uk](mailto:leanne.carveth@cs.ox.ac.uk)

### **C.4 Projects Committee**

**Chairman** Prof Ben Hambly  
email: [Ben.Hambly@maths.ox.ac.uk](mailto:Ben.Hambly@maths.ox.ac.uk)

### **C.5 Careers Service**

**Enquiries** (tel: (2)74646)  
email: [reception@careers.ox.ac.uk](mailto:reception@careers.ox.ac.uk)

## C.6 MURC

### General

webpage: <http://www.maths.ox.ac.uk~mure>

**Chairperson** Mr Ben Spells, Lincoln

email: [benjamin.spells@lincoln.ox.ac.uk](mailto:benjamin.spells@lincoln.ox.ac.uk)

## C.7 Invariants

### General

webpage: <http://www.invariants.org.uk>

**President** Phil Tootill, Jesus College

email: [president@invariants.org.uk](mailto:president@invariants.org.uk)

## C.8 General

**Disabilities Office** (tel: (2)80459)

email: [disability@admin.ox.ac.uk](mailto:disability@admin.ox.ac.uk)

**Counselling Service** (tel: (2)70300)

email: [reception@counserv.ox.ac.uk](mailto:reception@counserv.ox.ac.uk)

**Proctors' Office** (tel: (2)70090)

email: [proctors.office@proctors.ox.ac.uk](mailto:proctors.office@proctors.ox.ac.uk)

**Equal Opportunities Officer** (tel: (2)89825)

email: [equal.opportunities@admin.ox.ac.uk](mailto:equal.opportunities@admin.ox.ac.uk)

**Accessible Resources Acquisition and Creation Unit** (tel: (2)83862)

email: [aracu@bodleian.ox.ac.uk](mailto:aracu@bodleian.ox.ac.uk)

**Oxford University Student Union, Vice President (Welfare)** (tel: (2)88452)

email: [welfare@ousu.org](mailto:welfare@ousu.org)

## D Examination Conventions

You will be sent the examination conventions as part of the Notice to candidates prior to the examinations. They are also available at <https://www.maths.ox.ac.uk/notices/undergrad>.



## **E Programme Specifications**

The programme specifications are available at <https://www.maths.ox.ac.uk/teaching-staff/programme-specifications>

## **F Mathematical Institute Departmental Disability Statement**

The Institute will do everything within its power to make available its teaching and other resources to students and others with disabilities to ensure that they are not at a disadvantage. In some cases, this may require significant adjustments to the building and to teaching methods. Those with disabilities are encouraged to discuss their needs with the Academic Administrator [tel: 01865 615203, email [academic.administrator@maths.ox.ac.uk](mailto:academic.administrator@maths.ox.ac.uk)] at the earliest possible opportunity.

The Executive Committee is responsible for the department's disability policy.

The Academic Administrator will notify those directly involved with teaching and scheduling lectures. For instance, students with visual impairment might have lectures in rooms with whiteboards; students who are hard of hearing might have their lectures scheduled in a room with an induction loop. In some instances, it may be possible for lecturers to provide students with lecture notes, even when they are not posted on the Mathematical Institute website.

## G Mathematical Institute Complaints - Complaints within the Department

Undergraduates with a complaint should first normally discuss it with their college tutor.

If the concern or complaint relates to teaching or other provision **made by the faculty/department** then the student should raise it with the Director of Undergraduate Studies. Within the faculty/department the officer concerned will attempt to resolve your concern/complaint informally and as speedily as possible.

Students may also contact their student representatives for informal support on MURC and the Joint Consultative Committee for Undergraduates.

In thinking about causes of concern/complaint, please bear in mind that the first step if at all possible is to raise the matter that is troubling you with the person who is immediately responsible. If this is difficult, then many sources of advice are available within colleges, within faculties/departments and from bodies like OUSU or the Counselling Service, which have extensive experience in advising students. General areas of concern about provision affecting students as a whole should, of course, continue to be raised through Joint Consultative Committees via student representation on the faculty/department's committees.

If your concern or complaint relates to teaching or other provision **made by your college**, then you should raise it with your tutor or with one of the college officers, e.g. 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.

In the rare instances where you are dissatisfied with the outcome of a complaint, and all other avenues listed above have been explored, then you may take your concern further by making a formal complaint to the University Proctors. A complaint may cover aspects of teaching and learning (e.g. teaching facilities, supervision arrangements etc), and non-academic issues (e.g. support services, library services, university accommodation, university clubs and societies, etc.) A complaint to the Proctors should be made only if attempts at informal resolution have been unsuccessful.

Further information can be obtained from the Proctors Memorandum.

## H Policy on Intellectual Property Rights

The University of Oxford has in place arrangements governing the ownership and exploitation of intellectual property generated by students and researchers in the course of, or incidental to, their studies. These arrangements are set out in the University's *Statutes* under which the University claims ownership of certain forms of intellectual property which students may create. The main provisions in the *Statutes* are as follows.

### Section B. Intellectual Property

- (1) The University claims ownership of all intellectual property specified in section 6 of this statute which is devised, made, or created:
    - (a) by persons employed by the University in the course of their employment;
    - (b) by student members in the course of or incidentally to their studies;
    - (c) by other persons engaged in study or research in the University who, as a condition of their being granted access to the University's premises or facilities, have agreed in writing that this Part shall apply to them; and
    - (d) by persons engaged by the University under contracts for services during the course of or incidentally to that engagement.
  - (2) The University's rights under sub-section (1) above in relation to any particular piece of intellectual property may be waived or modified by agreement in writing with the person concerned.
6. The intellectual property of which ownership is claimed under section 5 (1) of this statute comprises:
- (1) works generated by computer hardware or software owned or operated by the University;
  - (2) works created with the aid of university facilities including (by way of example only) films, videos, photographs, multimedia works, typographic arrangements, and field and laboratory notebooks;
  - (3) patentable and non-patentable inventions;
  - (4) registered and unregistered designs, plant varieties, and topographies;
  - (5) university-commissioned works not within (1), (2), (3), or (4);
  - (6) databases, computer software, firmware, courseware, and related material not within (1), (2), (3), (4), or (5), but only if they may reasonably be considered to possess commercial potential; and
  - (7) know-how and information associated with the above.
7. The University will not assert any claim to the ownership of copyright in:
- (1) artistic works not listed in sub-section (2) of section 6 of this statute, books, articles, plays, lyrics, scores, or lectures, apart from those specifically commissioned by the University;

- (2) audio or visual aids to the giving of lectures;
- (3) student theses, exercises and answers to tests and examinations save to the extent that they contain intellectual property claimed by the University under subsection (6) of section 6 of this statute; or
- (4) computer-related works other than those specified in section 6 of this statute.

8. For the purpose of sections 6 and 7 of this statute, 'commissioned works' are works which the University has specifically employed or requested the person concerned to produce, whether in return for special payment or not, but, save as may be separately agreed between the University Press and the person concerned, works commissioned by the University Press in the course of its publishing business shall not be regarded as 'works commissioned by the University'.

9. Council may make regulations:

- (1) defining the classes of persons or naming individuals to whom section 5 (1) (c) of this statute shall apply;
- (2) requiring student members and such other persons as may be specified in regulations to sign any documents necessary in order to give effect to the claim made by the University in this Part and to waive any rights in respect of the subject-matter of the claim which may be conferred on them by Chapter IV of Part 1 of the Copyright, Designs and Patents Act 1988; and
- (3) generally for the purposes of this Part.

10. This Part shall apply to all intellectual property devised, made, or created on or after 1 October 2000 and is subject to the provisions of the Patents Act 1977.