



UNIVERSITY OF OXFORD
Department of Statistics

Mathematics and Statistics
Undergraduate Handbook
2015–16

This handbook applies to students starting the Mathematics and Statistics course in Michaelmas term 2015. The information in this handbook may be different for students starting in other years.

The Examination Regulations relating to this course are available at <https://www.admin.ox.ac.uk/examregs/2015-16/pexaminmath/studentview/> for the Preliminary Examination and <https://www.admin.ox.ac.uk/examregs/2015-16/hsomathandstat/studentview/> for the Final Honour School. If there is a conflict between information in this handbook and the Examination Regulations then you should follow the Examination Regulations. If you have any concerns please contact the Academic Administrator in the Department of Statistics (academic.administrator@stats.ox.ac.uk).

The information in this handbook is accurate as at October 2015, however it may be necessary for changes to be made in certain circumstances, as explained at <https://www.ox.ac.uk/coursechanges>. If such changes are made the department will publish a new version of this handbook together with a list of the changes and students will be informed.

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Comments or suggestions for matters which might be amended or which might usefully be covered in subsequent editions of this handbook would be welcome. They should be sent to the Academic Administrator in the Department of Statistics (academic.administrator@stats.ox.ac.uk).

1 Introduction

Welcome

Welcome to Oxford and to the Mathematics and Statistics course. We – the members of the Department of Statistics – are very pleased to welcome you to Oxford.

The Mathematics and Statistics course combines the strengths of the traditional mathematics course with the ability to pursue probability and statistics in depth, and reflects the strong demand from employers for graduates with statistical knowledge. You join an expanding number of researchers, lecturers and graduate students in statistics at Oxford. We hope that, as the course progresses, we can show you the interest and excitement of statistics and its applications. We also hope that your enthusiasm for the subject increases as you develop your talents in this field, and that your education here will equip you well for your future, wherever that may be.

We hope you find your time in Oxford enjoyable, challenging and rewarding.

Charlotte Deane (Head of Department) & Neil Laws (Director of Studies)
Department of Statistics

1.1 Purpose of this handbook

This handbook provides information about the Mathematics and Statistics course. There is also a separate *Handbook for the Undergraduate Mathematics Courses* which covers the Mathematics and Statistics course as well as the single-subject Mathematics course and the other joint Mathematics courses. This handbook cross references to the Mathematics handbook where appropriate. Both handbooks are available online:

http://www.stats.ox.ac.uk/current_students/bammath/course_handbooks

<http://www.maths.ox.ac.uk/members/students/undergraduate-courses/teaching-and-learning/handbooks-synopses>

You are given the handbooks at the beginning of your course and you will be informed of the availability of supplements, including synopses of lecture courses for each year of your course. Read in conjunction with the supplements, they explain how the course is structured, how the course is assessed, and give you information about other resources to which you have access.

The handbooks also give you some information about how colleges work in relation to your Mathematics and Statistics course. Your college tutors will give you more detailed information about the support provided within the tutorial system. Further information is also available in the form of College Handbooks on College websites.

1.2 Other important sources of information

Examination Regulations <http://www.admin.ox.ac.uk/examregs/>

These govern all academic matters within the University and contain the general regulations for the conduct of University examinations, as well as specific regulations for each degree programme offered by the University.

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.

Oxford Student Handbook <http://www.admin.ox.ac.uk/proctors/info/pam/>

This contains general information and guidance about studying at the University of Oxford, and gives you formal notification and explanation of the University's codes, regulations, policies and procedures.

Oxford Students website <http://www.ox.ac.uk/students>

This provides access to information, services and resources.

Synopses of lecture courses

At the start of each year the syllabi for the coming year's examinations are published together with the synopses of lecture courses. 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. Included with the course synopsis is the course reading list. For Prelims, a formal syllabus giving the examinable content is published. For Parts A, B and C the syllabi are defined by the synopses. The Prelims syllabi are available at

<http://www.maths.ox.ac.uk/members/students/undergraduate-courses/teaching-and-learning/handbooks-synopses>

The Parts A, B and C syllabi are available at

http://www.stats.ox.ac.uk/current_students/bammath/course_handbooks

where there are also guidance notes about Part C projects.

Lecture List

This gives the titles, times and places of lectures for courses and is available at

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

1.3 Contact points

There are a number of people in the department who can help you with any queries or problems you may have and their contact details are given below. If you are not sure who to contact please email academic.administrator@stats.ox.ac.uk

See also the list of contact emails and useful web addresses in the Mathematics handbook.

1.3.1 Department of Statistics

Director of Studies

Dr Neil Laws laws@stats.ox.ac.uk

Academic Administrator, Disability Co-ordinator

Mrs Jan Boylan boylan@stats.ox.ac.uk

1.3.2 Mathematical Institute

Director of Undergraduate Studies

Dr Richard Earl director-ugrad-studies@maths.ox.ac.uk

Academic Administrator

Mrs Charlotte Turner-Smith charlotte.turner-smith@maths.ox.ac.uk

1.3.3 Mathematics Undergraduate Representation Committee (MURC)

General

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

This page contains the list of college representatives who you can contact to raise an issue related to the teaching of the mathematics and joint schools degrees. Matters can also be sent to the MURC chair.

Chair Alex Homer (Oriental College) alexander.homer@oriel.ox.ac.uk

1.4 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 your responsibility should you choose to forward email to a system outside the University.

1.5 Your first weeks at Oxford University

You may have already read the guide *How do Undergraduates do Mathematics?* (originally prepared by Prof Charles Batty with the assistance of Prof Nick Woodhouse, with more recent updates by Dr Richard Earl, Prof Frances Kirwan and Dr Vicky Neale). If not, you are strongly recommended to read it as part of the induction to your course. It is available at https://www.maths.ox.ac.uk/system/files/attachments/study_public_0.pdf

The Mathematics Department induction session is held at 2pm on Friday Week 0 in the Mathematical Institute, lecture theatre 1, at which you will be given important documentation for your course. The corresponding Statistics Department induction session is held at 3.30pm on Friday Week 0 in the Department of Statistics lecture theatre.

Further useful information can be found at

<http://www.maths.ox.ac.uk/members/students/undergraduate-courses/teaching-and-learning/prelims-students>

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

1.6 The Department of Statistics

The Department of Statistics has about 30 lecturers/professors, 20 postdoctoral researchers and 60 research students. The Department is a world leader in research including computational statistics and statistical methodology, applied probability, bioinformatics and mathematical genetics. In the 2014 Research Excellence Framework (REF), Oxford's Mathematical Sciences submission was ranked overall best in the UK.

This is an exciting time for the Department. The University has allocated funding for the refurbishment of the former Mathematical Institute building on St Giles'. The new building will provide improved lecture and teaching space, a variety of interaction areas, and will bring together researchers in Probability and Statistics. It will create a highly visible centre for the Department in Oxford. The Department expects to move into the new facility in about January 2016. Currently, members of the Department are based in 1 and 2 South Parks Road, and also in the Peter Medawar Building for Pathogen Research and the Oxford Centre for Gene Function (OCGF) on South Parks Road.

1.7 The Mathematical Institute

The Mathematical Institute, on Woodstock Road, is a focus for mathematical activity in Oxford. All of your lectures in your first year will take place in the Institute.

2 Mathematics and Statistics

2.1 Overview

The University offers two courses in Mathematics and Statistics:

MMath	Mathematics & Statistics	4-year
BA	Mathematics & Statistics	3-year

The Master of Mathematics (MMath) in Mathematics and Statistics and the Bachelor of Arts (BA) in Mathematics and Statistics may be compared to national standards for higher education qualifications through the Framework for Higher Education Qualifications (FHEQ). The University awards framework (UAF) maps the awards of the University against the levels of the FHEQ. The FHEQ level for the MMath is 7 and for the BA is 6. The relevant subject benchmark statement for the course, which sets out expectations about standards of degrees in a given subject area, is Mathematics, Statistics and Operational Research (QAA 2015).

The courses are accredited by the Royal Statistical Society and graduates (with at least a Second Class degree result) can apply for the Society's professional status of Graduate Statistician (GradStat). This is a step on the way to the higher professional status of Chartered Statistician (CStat).

The aims of the courses and the intended learning outcomes are listed in Appendix A.

2.2 First year

The first year of the Mathematics and Statistics course is identical to the single subject Mathematics course. The first year examination is the *Preliminary Examination in Mathematics*, there is not a separate examination for Mathematics and Statistics. The Mathematics handbook (see 1.1) gives full details, including a list of important dates.

2.3 Second, Third and Fourth years

Many options are available in the second, third and fourth years. These vary a little from year to year depending on faculty interests and current research interests. The list of courses currently being taught can be found in the relevant course synopses available at http://www.stats.ox.ac.uk/current_students/bammath/course_handbooks

You will receive information on the options available to you, year by year, when it becomes available.

Section 3.7 of the Mathematics handbook (see 1.1) gives further information on the issues in Sections 2.6–2.8.

2.4 Second year (Part A)

The second year consists of compulsory core material on

- Algebra 1: Linear Algebra
- Differential Equations 1
- Metric Spaces and Complex Analysis
- Probability
- Statistics

plus long options on Algebra 2: Rings and Modules, Integration, Topology, Differential Equations 2, Numerical Analysis, Fluids and Waves, Quantum Theory, Simulation and Statistical Programming,

plus short options on Number Theory, Algebra 3: Group Theory, Projective Geometry, Introduction to Manifolds, Integral Transforms, Calculus of Variations, Graph Theory, Special Relativity, and Modelling in Mathematical Biology.

The core material is arranged as follows: Algebra 1, Differential Equations 1, Metric Spaces and Complex Analysis, and Probability are in Michaelmas Term; Statistics is in Hilary Term. The long options are in Hilary Term, except Quantum Theory which is in Michaelmas Term. The short options are in the first half of Trinity Term.

All students must offer 9 examination papers, and students may opt to offer an additional paper from the long options (making 10 papers in total) if they wish. Students considering taking an additional long option are advised to discuss this with their college tutors. The 9 or 10 papers offered must include the 5 papers on the core subjects and the paper on the short options, plus 3 or 4 papers on the long options.

2.5 Third and Fourth years (Parts B and C)

You will take the equivalent of eight 16-hour units in the third year from the schedule of Part B units; those continuing to the fourth year will take the equivalent of eight 16-hour units from the schedule of Part C 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 MSc students).

In Part B, all students must take the double-unit on applied statistics. You must also take two units (and you may take more) from the statistics units labelled SB2 and SB3. In Part C, all students must do a statistics project which counts as 3 of the 8 units. For this project, statistics is understood in a broad sense (so includes probability, etc). You must also take at least one further unit from the statistics menu of options.

2.6 Choosing options

When choosing options your college tutors will be able to give you advice. There are Options Fairs run in the Mathematical Institute in Trinity term – of your second year for Part B and of your third year for Part C – where representatives from the different subject groups (across mathematics and statistics) will discuss the individual options and be available to answer any questions you may have.

2.7 Three or four years

The choice of which degree you take will depend on your interests and aptitudes, your performance in the first three years and your career intentions. You should discuss your decision with your college tutors, who will be able to advise you on which course is more appropriate for you. **You will need to be awarded at least an Upper Second in the classification at the end of Part B (see Section 4.9.2) in order to progress to Part C.**

2.8 Changing course

Normally your college will have admitted you to study a specific course. Therefore you would need permission to change to another course. The structure of the Mathematics and Statistics course, particularly having the same first year as Mathematics, means that changing between from Mathematics to Mathematics and Statistics (or vice versa) is a possibility. Again, your College Tutor will be able to give you advice. Typically a number of students change from Mathematics to Mathematics and Statistics during the second year, changing later than this is also possible.

3 Teaching and Learning

3.1 The Departments and the 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. See Section 4 of the Mathematics handbook for a fuller description of the role of colleges.

The Mathematical Institute and the Statistics Department contain lecture theatres and seminar rooms in which lectures and intercollegiate classes are given. Problem sheets may be downloaded from the departments' websites, also some lecture notes. Most matters

concerned with the administration of the courses are dealt with in the departments – 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

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

3.2 An average week

Students are responsible for their own academic progress. 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. You are advised to read the University's guidance on undertaking paid work at <http://www.ox.ac.uk/students/life/experience>.

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. Please read Section 4 of the Mathematics handbook which gives advice on how to study, how to get the best out of lectures, the use of problem sheets and problem solving – that advice applies equally to Mathematics and Statistics students.

In summary, the main ingredient for success in mathematics/statistics 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.

3.3 Tutorials

To support lectures in the first and second 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.

The exception to the above is the Part A long option on Simulation and Statistical Programming: the workload of this option is equivalent to that of other long options, though the teaching is an integrated programme of lectures, practical sessions and problems classes.

3.4 Classes

Each 16-hour lecture unit in Parts B and C is supported by classes run under the Intercollegiate Class Scheme. Each Statistics course is supported by six 1-hour problems classes, whereas in Mathematics each such course is more commonly supported by four $1\frac{1}{2}$ -hour classes.

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. If you are ill and unable to attend the class please inform the Class Tutor in advance of the class.

Consultation sessions to help with revision are run during Trinity term.

3.5 Practicals

For some of the units there is a component of compulsory practical work, e.g. Computational Mathematics in the first year, Applied Statistics in the third year. 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.

3.6 Project

There are many things to be gained from doing a statistics project, which is why all fourth year students must do a statistics project and write a dissertation on it. In terms of your statistical education, a project is an opportunity to do a substantial and sustained piece of statistical work (and, for example, to develop further the skills learned in doing the third year applied statistics practical work). In addition, the general skills of organising material and explaining it are important to learn, and we also recognise that some students might show their abilities better in doing a project than on an examination paper.

4 Assessment and Examinations

4.1 College examinations

The tutorial, as well as a medium of instruction, is a personally tailored form of continuous, formative 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*, 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 an opportunity to check on how you are progressing academically and provide you with feedback to allow you to identify misunderstandings you may have with the material and improve your examination technique.

4.2 University examinations

You will sit examinations each year in Trinity term, called *public examinations*. The regulations governing these are set out in the University Examination Regulations (see Section 1.2) and guidance for students is given in the Examination Conventions which are published online at

<https://www.maths.ox.ac.uk/members/students/undergraduate-courses/examinations-assessments/examination-conventions>

for Prelims and at

http://www.stats.ox.ac.uk/current_students/bammath/examinations

for Parts A, B and C.

The definitive version of the conventions is made available online each October. Modifications must be published to prospective candidates not less than one whole term before the examination takes place. Examination conventions are the formal record of the specific assessment standards for the course or courses to which they apply. They set out how your examined work will be marked and how the resulting marks will be used to arrive at a final result and classification of you award. They include information on: marking scales, marking and classification criteria, scaling of marks, progression, resits, use of viva voce examinations, penalties for late submission, and penalties for over-length work.

For each examination (Prelims, Part A, Part B and Part C) the departments nominate a board of examiners, which is made up of internal examiners and, for the second public examinations, external examiners (academics from another university). Assessors may also be appointed to assist the examiners. Formally, the examiners are independent of the departments and of those who lecture courses. However, for written papers in mathematics and statistics, the examiners are expected to consult with course lecturers in the process of setting questions. It must be stressed that to preserve the independence of the examiners, students are strictly prohibited from contacting examiners directly about matters relating to the content or marking of papers. If you are unhappy with an aspect of your assessment you may make a complaint or appeal (see Section 7.2). The names of all examiners can be found in the relevant Examination Conventions.

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

4.3 Preparation, entering for University exams, exam timetables

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. The departments hold examination forums to provide advice on revision techniques and give further details about the format of the examinations.

In subjects which were taught in previous years, past examination papers are another good guide to the typical format and content of examination question. Past papers can be accessed online at <http://www.oxam.ox.ac.uk>. However, please note that previous papers may have been 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.maths.ox.ac.uk/members/students/undergraduate-courses/examinations-assessments/examiners-reports> and http://www.stats.ox.ac.uk/current_students/bammath/examinations/examiners_reports. Examiners' reports will include generic feedback on the cohort performance and may highlight common difficulties or mistakes made in the examinations.

The departments also runs consultation sessions for Part B and C students each Trinity term to help with revision. Details of sessions will be made available each Trinity term. Further advice on preparing for examinations and requesting alternative arrangements can be found on the University's website at <http://www.ox.ac.uk/students/academic/exams>.

Information about entering for examinations and examination timetables is given in the Mathematics handbook (see 1.1).

4.4 Procedure for written examinations

Before the examinations you will receive at least one *Notice to candidates* from the examiners to give you the details of the examination procedure. These notices are also published online:

<http://www.maths.ox.ac.uk/members/students/undergraduate-courses/examinations-assessments/examination-conventions>

http://www.stats.ox.ac.uk/current_students/bammath/examinations

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.

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

4.5 Marking of examinations

All mathematics and statistics examinations are marked by a single assessor or examiner according to a pre-agreed mark scheme which is strictly adhered to. The examination

scripts are then checked by an independent checker to ensure that all work has been marked.

The project options available in Part B and Part C, such as mini-projects/dissertations, are independently marked by at least two assessors. The examiners oversee the reconciliation of the marks according to the agreed reconciliation procedure.

4.6 University Standardised Marks

The marks for each individual examination paper or assessment you sit will be reported as University Standardised Marks (USMs). The object of the USMs is to allow direct comparison between the results of examinations in different subjects. Raw marks are turned into USMs by recalibration, sometimes necessary to ensure that all papers are fairly and equally rewarded. The correspondence between the USM ranges and classes in a classified examination is according to the following rules:

- 70–100: First Class
- 60–69: Upper Second Class
- 50–59: Lower Second Class
- 40–49: Third Class
- 30–39: Pass
- 0–29: Fail.

These marks reflect the qualitative descriptors given in Appendix B.

4.7 Examination results

You will be able to access your results via the Student Self Service (<https://evision.ox.ac.uk>). 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).

4.8 First Public Examination

At the end of the third term of the first year you will sit the Preliminary Examination in Mathematics, which you need to pass in order to proceed to Part A. The Mathematics handbook (see 1.1) gives full details.

4.9 Second Public Examination

4.9.1 Part A

Part A is taken at the end of the third term of the second year. In Part A, there are five Core papers A0, A1, A2, A8 and A9, nine papers A3–A7/A10–12 relating to the Long Options, and paper ASO relating to the Short Options. You are required to offer Papers A0, A1, A2, A8, A9 and ASO and three or four of Papers A3–A7/A10–12

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 Part B. Previous to 2013–14 the Part A Examination was in a different format, in particular you should pay attention to differences with previous past papers.

4.9.2 Part B

At the end of the third term of your third year you will take Part B. You will be examined in eight units (or equivalent). If you offer a double-unit option for examination this is given a weighting of two. The formal details of which combination of papers you may offer are published in the Examination Regulations (see 1.2).

On the basis of your performance in the Parts A and B examinations you will be classified (First, Upper Second, Lower Second, Third Class), or given a Pass, or failed, according to the following classification conventions which include a *Strong Paper Rule*. Students wishing to continue to Part C will need to obtain at least an Upper Second in the classification at the end of Part B.

Every candidate must offer

- 10 units at Part A (counting A2 as a double-unit and, for candidates offering 4 long options, two of the long options papers as half units)
- 8 units (or equivalent) at Part B.

The relative weightings of the Parts is as follows:

- The weighting of Part A is 40%.
- The weighting of Part B is 60%.

Your weighted average university standardised mark, $AvUSM$, is computed using these weights and your standardised marks on each unit ($AvUSM$ is symmetrically rounded [62.49 will be rounded down and 62.50 will be rounded up]).

Classification conventions

The classification after Part B is not determined solely by your $AvUSM$: there is also a *Strong Paper Rule* as follows. To satisfy the n th class strong paper rule:

- you need at least 6 units (or the equivalent) to have a mark of the n th class standard or above,
- and you also need at least 2 of these units (or the equivalent) to be in Part B.

For example, to satisfy the First class strong paper rule you need at least 6 units (or the equivalent) with marks of 70 or above, with at least 2 of these units (or the equivalent) being in Part B.

Classifications are determined as follows:

- First Class: $AvUSM \geq 70$ and the first class strong paper rule is satisfied.
- Upper Second Class: EITHER $AvUSM \geq 70$ and the first class strong paper rule is not satisfied

OR $60 \leq AvUSM < 70$ and the upper second strong paper rule is satisfied.

- Lower Second Class: EITHER $60 \leq AvUSM < 70$ and the upper second strong paper rule is not satisfied

OR $50 \leq AvUSM < 60$ and the lower second strong paper rule is satisfied.

- Third Class: EITHER $40 \leq AvUSM < 50$

OR $50 \leq AvUSM < 60$ and the lower second strong paper rule is not satisfied.

- Pass: $30 \leq AvUSM < 40$.
- Fail: $AvUSM < 30$.

4.9.3 Part C

If you take the MMath course, you will sit the Part C examination at the end of your fourth year and be examined in eight units (or equivalent). If you offer a double-unit option for examination this is given a weighting of two, and triple-units are given a weighting of three. You will receive a class at the end of Part B (as above) and a separate class for Part C according to the following classification conventions.

Let $AvUSMC$ denote the weighted average of USMs achieved in Part C (symmetrically rounded).

- First Class: $AvUSMC \geq 70$.
- Upper Second Class: $60 \leq AvUSMC < 70$.
- Lower Second Class: $50 \leq AvUSMC < 60$.
- Third Class: $40 \leq AvUSMC < 50$.

4.9.4 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 procedures.

4.10 Prizes

The following prizes are available for undergraduate students. These are awarded by the Examiners, no application is necessary. A list of previous winners is available online: http://www.stats.ox.ac.uk/current_students/bammath/examinations/undergraduate_prizes

Mathematics and Statistics candidates are eligible for the prizes for the Preliminary Examination in Mathematics, and for the Mathematics Gibbs Prizes in Parts A and B. In addition, the separate prizes for Mathematics and Statistics are:

Part A	Department of Statistics Prize
Part B	Department of Statistics Prize
Part C overall	Gibbs Prize
Part C dissertation	Department of Statistics Prize
RSS Prize (Part C)	One year's RSS membership

4.11 Avoiding plagiarism

The following information applies to all aspects of assessment during the course.

Plagiarism is presenting someone else's work or ideas as your own, with or without their consent, by incorporating it into your work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition. Plagiarism may be intentional or reckless, or unintentional. Under the regulations for examinations, intentional or reckless plagiarism is a disciplinary offence.

See <http://www.ox.ac.uk/students/academic/guidance/skills/plagiarism>

Subject specific advice

It is worth highlighting three places where plagiarism could occur and where you should be particularly careful to avoid it:

- in Part B assessed practical assignments
- in Part C dissertations
- in Part C mini-projects.

As some issues about practicals are different from some issues about dissertations, and as these are in the 3rd and 4th years of the course, you will be issued with more detailed guidance about practicals and dissertations separately. But some important general points are relevant to mention here:

- The practical work or dissertation or mini-project that you hand in must be your own.
- Do not copy any other person's practical report (and do not allow your own work to be copied). Although you may discuss the practicals with other students during practical classes for example, the report you hand in must be all your own work.
- You will need to sign a statement confirming that the work you have handed in is all your own.
- You must not copy chunks of text from lecture notes, books, websites, etc, unless unless you clearly acknowledge and adequately reference what you have used. For example in a practical you need to give your own explanation of what you have found, not somebody else's.
- Throughout a dissertation, you must make sure that other people's work is adequately referenced.

5 Study Skills and Resources

Please read Section 6 of the Mathematics handbook (see 1.1) which gives guidance and advice about study skills and resources to all mathematics students, including those studying Mathematics and Statistics.

Additional information relevant to Mathematics and Statistics students:

Disability Related Study Support. Specialised advice and assistance is available from the Disability Advisory Service (<http://www.admin.ox.ac.uk/eop/>). If you experience

difficulties with your course because of a disability then you should discuss this with your college tutors. Please also see the disability statements of the Mathematical Institute (in the Mathematics handbook) and of the Department of Statistics (Appendix D).

Department of Statistics buildings. Current departmental buildings contain a lecture room and several seminar rooms. There are also common rooms in 1 and 2 South Parks Road which undergraduates are able to use when in the department. The department expects to move to its new home in St Giles' during 2015–16 and we expect the new building to offer enhanced facilities.

Careers. In addition to the careers information in the Mathematics handbook, it is worth mentioning here that representatives from the Careers Service (<http://www.careers.ox.ac.uk/>) regularly give short presentations at some departmental induction sessions at the start of the academic year.

6 Student representation, evaluation and feedback

6.1 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. Feedback is formally sought through surveys conducted by the Mathematical Institute, Department of Statistics and the University, and also the National Student Survey. All input from undergraduates about the course content, structure and facilities generally is welcomed by the department and taken seriously.

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. A specimen questionnaire form can be downloaded from the web at <http://www.maths.ox.ac.uk/members/students/undergraduate-courses/undergraduate-representation/forms-and-questionnaires>.

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). The statistical feedback from the questionnaires is sent to a designated undergraduate member of the Mathematics Undergraduate Representation Committee for consideration by MURC and a report brought to JCCU. Any action taken as a result of questionnaire comments is made known to your MURC representatives through JCCU.

Students on full-time and part-time matriculated courses are surveyed once per year on all aspects of their course (learning, living, pastoral support, college) through the Student Barometer. Previous results can be viewed by students, staff and the general public at: <http://www.ox.ac.uk/students/life/feedback>.

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

The results of both these surveys are discussed by the Teaching Committee and appropriate action agreed as necessary.

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

6.2 Student representation

All of the following are described in detail in the Mathematics handbook, please see Section 7 of that handbook.

- The Mathematics Undergraduate Representative Committee (known as ‘MURC’) is a student body representing the interests of mathematics and joint school students. MURC has a designated Mathematics and Statistics rep.
- The Joint Consultative Committee with Undergraduates (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, and as mentioned above the statistical feedback from questionnaires. The membership consists of members of MURC appointed by MURC and representatives of the departments of Mathematics and of Statistics.
- The MPLS Division runs a divisional Undergraduate Joint Consultative Forum (UJCF) which is chaired by the senior MPLS academic who is responsible for that area across the division. An undergraduate representative from each department within the MPLS Division attends the forum. In addition, an undergraduate representative attends the meetings of the Divisional Board and the MPLS Academic Committee.
- Undergraduate representation at University (as opposed to subject or college) level is coordinated through the Oxford University Student Union (OUSU). Student representatives sitting on the Divisional Board are selected through a process organised by OUSU. Details can be found on the OUSU website along with information about student representation at the University level.

7 Student life and support

7.1 Who to contact for help

It is not unusual for students to experience a difficulty of one kind or another. There are a number of people that are ready and willing to help you. Often the best advice is to go and talk to your College Tutor in the first instance.

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

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

7.2 Complaints and appeals

In the rare case of a student wishing to make an appeal against an examination result, the appeal is made on their behalf by their college to the Proctors. Students should also be aware that they have the right to take certain other matters directly to the Proctors.

See Appendix C for the formal procedure for complaints and appeals within the Department of Statistics, and see the Mathematics handbook for the corresponding information for the Mathematical Institute.

7.3 Student societies

There are over 200 clubs and societies covering a wide range of interests which you can join or attend, see <http://www.ox.ac.uk/students/life/clubs/list>. See also the Mathematics handbook for details of two mathematics societies, the *Invariants Society* and the *Mirzakhani Society*.

7.4 Policies and regulations

The University has a wide range of policies and regulations that apply to students. These are easily accessible through the A-Z of University regulations, codes of conduct and policies available on the Oxford Students website <http://www.ox.ac.uk/students/academic/regulations/a-z>.

8 Facilities

8.1 Social spaces and facilities

The Department of Statistics expects to move to a newly refurbished building in St Giles' in December 2015/January 2016. This building will have a large social space on the ground floor with a kitchen area.

For information about the Mathematical Institute, see the Mathematics handbook.

8.2 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, 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.

Mathematics and Statistics students are welcome to use the Statistics departmental library in connection with their Part C project.

8.3 IT

All students will be automatically allocated a University email account and may register for further services with IT Services (<http://www.it.ox.ac.uk/>).

See the Mathematics handbook for a description of IT in connection with your mathematics courses.

During your second year you can take a long option on Simulation and Statistical Programming. Following the move of the Statistics department to St Giles', this will be taught in the department's new computer teaching lab, using departmental computers. There will be similar arrangements for statistics practicals in later years of the course.

Mathematics and Statistics students are welcome to apply for a departmental computer account should they need one in connection with their Part C project.

Appendices

A Course aims and intended learning outcomes

The educational aims of the programme are:

- To provide a course of high academic quality in Mathematics and Statistics in a challenging and supportive learning environment that encourages students to reach their full potential, personally and academically.
- To provide students with a broad, balanced knowledge of Mathematics and Statistics and an appreciation of their applications.
- To provide a course that is suitable both for students aiming to pursue research and for students going into other careers, in particular careers requiring numeracy, together with modelling and problem-solving abilities.
- For students taking the 4-year MMath, to provide foundations for graduate study for a research degree at a leading university either in the UK or overseas.

The intended learning outcomes are that students will develop a knowledge and understanding of:

- The core areas of Mathematics and Statistics, the basic ideas of mathematical and statistical modelling, and some of their principal areas of application.
- The correct use of mathematical language and formalism in mathematical thinking and logical processes.
- Some of the processes and pitfalls of mathematical approximation.
- Techniques of manipulation and computer-aided numerical calculation.
- The basic ideas of a variety of areas of specialisation.
- Statistical inference and the application of statistical methods.
- Several specialised areas of Mathematics and Statistics or their applications, the principal results in these areas, how they relate to real-world problems and to problems within Mathematics and Statistics.

B Qualitative descriptors

The qualitative descriptions of the classes are as follows.

Class I The candidate shows excellent skills in reasoning, deductive logic and problem-solving. He/she demonstrates an excellent knowledge of the material, and is able to use that in unfamiliar contexts.

Class III The candidate shows good or very good skills in reasoning, deductive logic and problem-solving. He/she demonstrates a good or very good knowledge of much of the material.

Class IIIi The candidate shows adequate basic skills in reasoning, deductive logic and problem-solving. He/she demonstrates a sound knowledge of much of the material.

Class III The candidate shows reasonable understanding of at least part of the basic material and some skills in reasoning, deductive logic and problem-solving.

Pass The candidate shows some limited grasp of at least part of the basic material.

Fail Little evidence of competence in the topics examined; the work is likely to show major misunderstanding and confusion, coupled with inaccurate calculations; the answers to the questions attempted are likely to be fragmentary only.

[Note that the aggregation rules in some circumstances allow a stronger performance on some papers to compensate for a weaker performance on others.]

C Complaints and Appeals

Complaints and academic appeals within the Department of Statistics

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

Nothing in the University's complaints procedure precludes an informal discussion with the person immediately responsible for the issue that you wish to complain about (and who may not be one of the individuals identified below). This is often the simplest way to achieve a satisfactory resolution.

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

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

Complaints

If your concern or complaint relates to teaching or other provision made by the department, then you should raise it with the Chair of the Teaching Committee (Dr Neil Laws). Within the department the officer concerned will attempt to resolve your concern/complaint informally.

If you are dissatisfied with the outcome, then you may take your concern further by making a formal complaint to the University Proctors. The procedures adopted by the Proctors for the consideration of complaints and appeals are described on the Proctors' webpage (<http://www.admin.ox.ac.uk/proctors/complaints/proceduresforhandlingcomplaints>), the Student Handbook (<http://www.admin.ox.ac.uk/proctors/info/pam>) and the relevant Council regulations (<http://www.admin.ox.ac.uk/statutes/regulations/247-062.shtml>).

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

Academic appeals

An academic appeal is defined as a formal questioning of a decision on an academic matter made by the responsible academic body.

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

As noted above, the procedures adopted by the Proctors in relation to complaints and appeals are described on the Proctors' webpage (<http://www.admin.ox.ac.uk/proctors/complaints/proceduresforhandlingcomplaints>), the Student Handbook (<http://www.admin.ox.ac.uk/proctors/info/pam>) and the relevant Council regulations (<http://www.admin.ox.ac.uk/statutes/regulations/247-062.shtml>).

Please remember in connection with all the academic appeals that:

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

D Department of Statistics Disability Statement

The Department 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 Disability Coordinator, Mrs Jan Boylan
[tel: 01865 (2)72870, email academic.administrator@stats.ox.ac.uk].