

OXFORD UNIVERSITY
JOINT COMMITTEE FOR MATHEMATICS AND
PHILOSOPHY

November 2009

**Programme Specification for the
B.A. AND Masters IN MATHEMATICS AND
PHILOSOPHY**

Awarding institution/body

Oxford University

Teaching institution

Oxford University

Programme accredited by

n/a

Final award

B.A. (Hons)/MMathPhil

Programme

Mathematics and Philosophy

UCAS code

BA/MatPhi GV15

Relevant subject benchmark statements:

for Mathematics, Statistics and Operational Research, and for Philosophy.

<http://www.qaa.ac.uk/academicinfrastructure/benchmark/statements/Maths07.asp>

Date of programme specification

November 2009

1 Educational aims of the Mathematics programme

- to provide, within the supportive and stimulating environment of the collegiate university, a course in mathematics and philosophy of the highest academic quality which attracts highly able students from the U.K. and abroad;

- to instil an understanding of the nature of mathematics, including logic as a natural bridge with philosophy, and of mathematical thinking;
- to enable students to appreciate the interest and importance of philosophical questions on a variety of topics, including the philosophy of mathematics, and to contribute to the discussion of these questions;
- to enhance understanding of both mathematics and philosophy by parallel study of these related disciplines with particular emphasis on the interdisciplinary subjects of logic and philosophy of mathematics;
- to provide a learning environment which draws on the wide-ranging talents and expertise of staff in both mathematics and philosophy and challenges and encourages students, with their differing needs, interests, and aspirations, to reach their full potential, personally and academically;
- to develop transferable skills related to problem solving, as well as promoting the ability to think independently, to develop powers of critical analysis, of sustained argumentation and of clear and effective communication both orally and in writing;
- to bring students to a position on graduation that allows them to choose confidently from many different careers, and enables them to contribute rapidly to their chosen employment

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

- to provide the foundations for graduate study for a research degree at a leading university, in the UK or abroad, in either mathematics or philosophy.

2 Mathematics Programme outcomes

Students will develop a knowledge and understanding of	Related teaching/learning methods and strategies
1. The core areas of pure mathematics, and the basic ideas of some areas of specialisation.	1. In the first four terms of the programme there are lectures on algebra, analysis, and geometry supported by discussion with a tutor in college-based tutorials or small classes. In the second half of the second year, a choice of lecture courses is supported by college based tutorials or small classes.
2. The correct use of mathematical language and formalism in mathematical thinking and logical processes.	2. Example in lectures in the first two years, practice in weekly problem sheets, with critical feedback by college tutors, tutorial discussion, printed notes of guidance (also available on the web).
3. The elements of the foundations of mathematics.	3. Lectures in the first and second years in Logic and Set Theory, supported in the first year by college-based tutorials and classes, and in the second year by problem classes conducted by subject specialists.
4. Some area or areas of specialisation in pure mathematics. Advanced topics in pure mathematics for those students who choose the options that reach this level.	4. Lectures in the third and fourth years delivered by lecturers actively engaged in research, together with supporting problem classes conducted by subject specialists.

For the links between the Educational aims of the Mathematics programme and the Mathematics Programme outcomes, see the Mathematics programme specification.

2.1 Assessment

Formative assessment is carried out through tutorials, classes and termly practice examinations (collections), which are marked and returned to students. These are provided at college level and have no influence upon university examinations.

Summative assessment is by four 3-hour written examinations at the end of year one, and by three 2-hour written examinations at the end of year two. These examinations are designed to test through bookwork and unseen problems breadth of understanding of core subjects across the whole syllabus and through further questions on bookwork and more substantial unseen problems understanding in depth of both core and optional subjects. In years three and four, most assessment is by unseen written examinations of three hours duration, though some are shorter, and there is also some assessment by theses and projects.

2.2 Skills and attributes

Students will have the opportunity to develop the following skills during the course:

I Intellectual skills
<i>In mathematics</i>
1. The ability to demonstrate knowledge of key mathematical concepts and topics, both explicitly and by applying them to the solution of problems.
2. The ability to comprehend problems, abstract the essentials of problems and formulate them mathematically and in symbolic form so as to facilitate their analysis and solution.
3. The ability to select and apply appropriate mathematical processes to problems including, where appropriate, an understanding that this might give only a partial solution.
4. Skill in giving mathematically rigorous arguments and in the logical development of formal theories.
5. The ability to present mathematical arguments and conclusions from them with clarity and accuracy, in forms suitable for the audiences being addressed.
6. Skill in understanding and using the generality that is achieved in mathematics by establishing results abstractly.
<i>In philosophy</i>
7. Ability to digest and assess several diverging answers to philosophical questions, to make up their own minds on the issues, and to argue for their own view in a clear and cogent fashion.
8. Ability to abstract, analyse and construct sound arguments and identify logical fallacies.
9. Skill in independent and creative philosophical thinking, moving between generalisation and appropriately detailed discussion, inventing or discovering examples to support or challenge a position, and distinguishing relevant and irrelevant considerations.
10. Willingness to evaluate opposing arguments, to formulate and consider the best arguments for different views, to identify the weakest elements of the most persuasive view, to make up their own minds on the issues, and to argue for their own view in a clear and cogent fashion.
11. Understanding and appreciation of perspectives different from their own.
<i>In both mathematics and philosophy</i>
12. The ability to construct logically valid arguments with clear identification of assumptions and conclusions.

Teaching/learning methods and strategies

These are acquired through lectures, classes, tutorials, studying recommended textbooks and through work done for projects and dissertations.

2.3 Assessment

These intellectual skills are tested summatively in the examination processes at the end of each year, in projects and dissertations, and formatively in weekly tutorials or classes, and college collections.

II. Practical skills	Teaching/Learning methods and strategies
1. Calculating fluently and accurately in abstract notation.	1. Practised throughout the mathematics part of the course in problem solving for tutorials and classes. When necessary, mathematics tutorial teaching focuses on helping students to improve these essential skills.

2.4 Assessment

All problem-solving for Mathematics tutorials and classes and college collections provides formative assessment of this skill, and examinations at the end of each year assess this skill summatively.

III. General skills	Teaching/Learning methods and strategies
1. To analyse and solve problems, and to reason logically and creatively.	1. Problem sheets in mathematics, including logic, with tutorial or class support, often requiring significant develop of ideas beyond material found in lectures and books.
2. To analyse arguments by identifying their assumptions, and to assess their cogency.	2. Preparation including reading and essay writing for tutorials and classes in philosophy.
3. Effective communication and presentation orally.	3. Weekly tutorial and class assignments; requirement to defend written work in tutorials, and presentation of mathematical solutions or philosophical views in classes.
4. The ability to learn independently.	4. A learning process that requires students to put together material from a number of sources, including lectures, tutorials, text-books, and electronic sources, largely in their own time.
5. Independent time management.	5. Requirement to produce substantial amounts of written work against strict tutorial and class deadlines; necessity to balance academic and non-academic activities without continuous oversight.
6. To think critically about arguments and solutions and to defend an intellectual position.	6. Discussion and criticism in tutorials
7. Collaboration	7. Students are encouraged by the tutorial system to work together, to share ideas and concepts and to develop the practice of crediting others for their contributions.
8. Use of information technology.	8. The use of web-based resources in philosophy provided through the library sector; extensive use of the network for distributing teaching materials and for communication; optional participation in the first-year Mathematics course on the use of Maple.
9. Language skills.	9. The opportunity may be available in the third or fourth year to study a foreign language.

2.5 Assessment

The tutorial system provides formative assessment of (1-6). There is summative assessment of (1-3) in annual examinations. The language option does not contribute to final class, but successful completion will be recorded on student transcripts.

3 Programme structures and features

The programme is offered as a four-year course leading to the MMathPhilBA in Mathematics and Philosophy or, for those choosing to leave after three years, a BA in Mathematics and Philosophy.

3.1 subjects

This foundation year facilitates the transition from school to university and is designed:

- to ensure that all students have an adequate facility with elementary mathematical technique;
- to ensure that all students have adequate knowledge of the syllabuses in Mathematics and Further Mathematics A-level to the depth that the course requires, recognising that students come from a variety of backgrounds;
- to ensure that students develop the techniques necessary for pure mathematics at Moderations level;
- to teach students to present mathematics professionally;
- to ensure that all students master the basic results and ideas of formal and philosophical logic;
- to provide students with mastery of two major philosophical texts (one seminal for the whole of modern philosophy, the other seminal for the foundations of mathematics and philosophy of mathematics);
- to teach students to argue rigorously and develop a critical faculty;
- to allow students to adapt to the change of style and pace of a university course.

All students study the same material in the first year (no options) leading to the Honour Moderations in Mathematics and Philosophy Examination. The aim is to bring students from diverse backgrounds to the same point in one year, to allow them to discover the different branches of pure mathematics for which they have a natural aptitude and which they particularly like, so they have the opportunity to enjoy choosing from the range of pure options available in later years, and to develop analytical rigour and the ability to criticise and reason logically as a foundation for further study in philosophy.

This Examination consists of four papers:

Paper A. Pure Mathematics I

Paper B. Pure Mathematics II

Paper C. Elements of Deductive Logic (set texts : Hodges, Logic, and Sainsbury, Logical Forms)

Paper D. Introduction to Philosophy (set text : Frege, Foundations of Arithmetic)

There is also a resit examination, the Preliminary Examination in Mathematics and Philosophy, taken in the summer vacation consisting of two papers:

Paper 1. Pure Mathematics

Paper 2. Philosophy

3.2 Assessment

Students' progress during the year is monitored continuously in weekly tutorials, and also by college collections with diagnostic feedback. For the Moderations Examination, students must sit all four papers at the same time. To obtain a Pass a candidate must pass both in Mathematics and in Philosophy. The Moderators indicate on the pass list each candidate who has not passed this examination but has passed in one subject and which subject the candidate has passed. A student who is not awarded a Pass in Moderations but who subsequently passes the Preliminary Examination taken during the summer vacation may, at the discretion of the student's college, proceed to the second year of the course.

3.3 Year 2

3.3.1 Subjects

In the second year, Mathematics and Philosophy students study one half of the syllabus for the Honour School of Mathematics. The compulsory core of Algebra and Analysis is completed in the first term, and students then choose from a menu of second year Pure Options: Groups in Action, Introduction to Fields, Number Theory, Integration, Topology, Multivariable Calculus.

They also continue study of Philosophy, normally one of the compulsory papers, Knowledge and Reality, and one other paper chosen from a wide ranging menu of some 17 courses available to all courses which include Philosophy.

The Joint Committee for Mathematics and Philosophy considers it desirable that B1 Foundations, which provides essential background for the compulsory paper on the Philosophy of Mathematics, should also be studied during the first and second terms of the second year (in doing so they are able to draw on the background they have obtained from their study of Logic and of Frege's Foundations in their first year), though individual tutors and students may have reason to defer study of at least part of this paper until the first term of the third year.

The syllabus for the compulsory core and the options in Mathematics is examined at the end of the year in the Part A examination which consists of three 2 hour papers:

$AC1(P)$: *Algebra and Analysis*
 $AC2(P)$: *Algebra and Analysis*
 $AO3(P)$: *Options*

3.3.2 Assessment

Students continue to be monitored in weekly college tutorials or classes together with college collections with diagnostic feedback.

The Part A examination taken at the end of the second year consists of cross-section papers designed so that both breadth and depth of coverage of the syllabus are assessed.

Papers $AC1(P)$ and $AC2(P)$ cover the syllabus of the two compulsory core topics: Algebra and Analysis. Paper $AC1(P)$ consists of 6 short, very straightforward questions. The aim of the paper is to assess the breadth of coverage of the compulsory core at a basic level and students are expected to answer all questions. Paper

AC2(P) consists of 6 questions of a more traditional style where depth of knowledge is tested.

Paper AO3(P) is a cross-section paper on the menu of optional units and half-units and has two sections, one assessing breadth and the other depth with questions in the style of those for Papers AC1(P) and AC2(P) respectively.

The three papers taken together are given the weight of two 3-hour papers.

There is no summative assessment in the second year in Philosophy. Subjects studied during the second year are examined in the Part B examination at the end of the third year.

3.4 Years 3 and 4

The main aim in the third and fourth years is to offer the opportunity to study a range of options in pure mathematics and in philosophy designed and taught by specialists within the highly research active faculties. The menu of options is constructed to encourage flexibility within a coherent structure.

Mathematics

In Mathematics, the options are the units and half units offered for the BA/MMath in Mathematics. These will include a range of units (usually designated as 'H-level', aimed at third year undergraduates) covering pure mathematics from foundations (logic and set theory), which is a compulsory unit for Mathematics and Philosophy, through the main-line subjects of algebra, analysis and geometry, in addition to the possibility of an extended essay. In Part (designated as 'M-level', aimed primarily at 4th year undergraduates and MSc students), there will be a wide variety of units and half-units covering almost all specialisms in pure mathematics, in addition to the possibility of a dissertation; these will include units and half units in Mathematical Logic as specified by the Joint Committee for Mathematics and Philosophy.

Most Part B and Part C units or half-units will be assessed through examination papers of the traditional kind but some will be assessed through mini-projects, coursework, extended essays or dissertations; most H-level material will be assessed in separate examination papers.

Mathematics Department units and half-units will usually be of the following kinds:

- 32 lectures supported by 8 1 hour intercollegiate problems classes (Part B) or 14 1 hour intercollegiate problem classes (Part C) and assessed by traditional examination paper;
- 16 lectures supported by 4 1 hour intercollegiate problems classes (Part B) or 7 1 hour intercollegiate problem classes (Part C) and assessed by traditional examination paper;
- a project equivalent to either a whole or half unit and assessed by extended essay/dissertation.

Most units and half-units offered will be confirmed by the Trinity Term of the year before they are studied. Full details of each course, including prerequisites, any preparatory reading, syllabus, method of delivery, reading list and method of

assessment are published by the Mathematical Institute in the Course Handbooks by the start of Michaelmas Term in the year in which they are studied.

Philosophy

The menu of subjects in Philosophy for Mathematics and Philosophy is the same as that for Philosophy in all Honour Schools including Philosophy and is published in the Examination Regulations. In addition to the two compulsory subjects, Knowledge and Reality, and Philosophy of Mathematics, the subjects offered are History of Philosophy from Descartes to Kant; Ethics; Philosophy of Mind; Philosophy of Science and Philosophy of Psychology and Neuroscience; Philosophy of Science and Social Science; Philosophy of Religion; Philosophy of Logic and Language; Aesthetics and the Philosophy of Criticism; Medieval Philosophy; Continental Philosophy from Descartes to Leibniz; the Philosophy of Kant; Post-Kantian Philosophy; Theory of Politics; Plato: Republic; Aristotle: Nicomachean Ethics; Frege, Russell, and Wittgenstein; the later Philosophy of Wittgenstein; Intermediate Philosophy of Physics.

Core lectures are given for each of these subjects, which candidates are expected to attend, in addition to tutorials, either eight, for which each candidate is expected to write six essays, or four tutorials, for which four essays are written, plus a Faculty Class, with between five and ten students, for which two essays are written. Each subject is examined in a three-hour written paper.

Assessment

The examinations in the third year of the course are referred to as Part B and the examinations in the fourth year of the course as Part C.

3.4.1 Part B

Each candidate is required to offer Mathematics units and Philosophy subjects so that the sum of the total number of units and the total number of subjects is six and such that

- a total of at least two units, of which one must be Foundations, shall be offered in Mathematics, from the Schedule of 'Mathematics Department Units';
- in addition, candidates are permitted to offer up to one unit from the list of 'Other Mathematical Units', so long as they offer a total of three units in Mathematics;
- at least three subjects, of which two must be Knowledge and Reality, and Philosophy of Mathematics, shall be offered in Philosophy.

3.4.2 Part C

Each candidate shall offer a total of three units chosen in any combination from the lists for Mathematics and for Philosophy. No subject is compulsory. No unit or half unit in Mathematics, and no subject in Philosophy, may be offered in both Part B and Part C.

Mathematics

Units in Mathematics are taken from the schedule of units and half units for Part C of the Honour School of Mathematics.

Philosophy

A unit in Philosophy consists of one of the subjects 101, 103-18, 120 as specified in the Regulations for Philosophy in all Honour Schools including Philosophy, or the Rise of Modern Logic as specified in the Regulations for the Degree of Bachelor of Philosophy, or a Thesis.

4 Support for Students and their learning

4.1 College support

Each student in Mathematics and Philosophy has a College Tutor in Mathematics and a College Tutor in Philosophy who oversees their academic progress in the two sides of the school. The College Tutors arrange college teaching (tutorials and classes), advise on general academic matters such as choice of options, oversee library provision of relevant texts in the college, arrange college collections, provide career advice (when requested) and references. Each undergraduate also has a Personal Tutor or Advisor (who may be one of their College Tutors) concerned with the student's personal welfare and to whom the student can turn for support and advice on non-academic matters.

In addition, in each college there are a number of other people to whom students may turn for advice and support: Senior Tutor, Dean, Junior Dean, Chaplain, College Counsellor, College Doctor and Nurse. All students can apply to college and University hardship funds and, for some purposes, travel funds.

4.2 Role of college tutorials and classes, and intercollegiate classes

Undergraduates have college tutorials and classes to support the syllabus in the first and the second years of the degree course (typically two paired tutorials per week) for which students submit written work (normally solutions to set problems in mathematics or logic or essays in philosophy). Lecturers in Mathematics provide problem sheets to support the lecture courses and college tutors may set these problems for solution and discussion in tutorials. However, college tutors may set alternative or additional problems. In philosophy, this pattern of college based tutorials is continued into the third and fourth years of the degree course. Classes under the guidance of a tutor in which students present their own views on a given topic for discussion in a group of up to 10 students studying a variety of courses involving Philosophy may also be used. In mathematics, the syllabuses for the third and fourth years are supported by (centrally organised) intercollegiate classes which typically contain 6-10 students and are given by a class tutor supported by a teaching assistant. For these classes students submit their written solutions to problems set by lecturers before each class for marking by the teaching assistant or class tutor. Through the departmentally coordinated intercollegiate class system, the intention is that students are taught by experts in the field, usually without the need to restrict numbers of students taking options. A record of attendance and student achievement is recorded on the class database. College tutors have access to the database and can monitor the attendance and achievement of students at their college during the term.

4.3 Library provision

University and college libraries provide students with excellent resources. College libraries are specifically for the use of members of that college, and provide books for loan which are easily accessible to undergraduates. Colleges differ in their library provision, though all aim to provide the primary course texts needed for the subjects studied by their undergraduates. In Mathematics, it is general practice for College libraries to purchase books which appear in the Main Reading Lists for all first, second and third year courses. Also, in practice, College Libraries tend to provide a good selection of the books listed as 'Further Reading' for these courses. They frequently hold a number of copies of popular books and are often responsive to requests for new purchases. Different colleges have different mechanisms for these requests. Students are advised to contact their college tutors for advice.

The Hooke library contains multiple copies of mathematics books heavily used by undergraduates, and the Philosophy Library provides multiple copies of heavily used books in Philosophy, as well as more specialized books. The University Library, the Bodleian, is one of the great libraries of the world, but does not lend books, which guarantees their availability but means that they must be read, or photocopied from, in the library. The Radcliffe Science Library, which is part of the Bodleian, contains a good collection of mathematics books. There is increasing provision of academic material on the web, including many journals, and librarians are very good at helping readers to access this material.

Other excellent resources are: first rate local bookshops; a successful student-run second hand book-stall; Mathematical Institute Notes (mini-text books written by subfaculty members and produced cheaply at the Mathematical Institute); an increasing electronic archive of lecture notes and problem sets; many text books written by staff members; easily available past examination papers (electronic archive); detailed examiners' reports available on the Mathematical Institute Web site and in college libraries.

4.4 IT

The provision of IT services and access to them is made within the context of the University's IT policy. The university has installed the IT network infrastructure, manages central servers, and provides training courses. Users have benefitted from substantial college enhancements. All students are given accounts on a Mathematical Institute server to enable them to access the Mathematical Institute network, and email accounts with the University network. Information is circulated to students in a number of ways: key general academic information and learning materials as well as past examination papers and reports on past examinations are posted on the Mathematical Institute and Philosophy Centre web-sites, students are sent information by e-mail and in hard-copy when appropriate. The Department of Mathematics provides all computing facilities necessary for any practical work involved with its courses. The Philosophy Centre provides computing facilities for students studying logic in their first year (which runs Logic Works, Tarski's World, and TABLEAU); an online Introduction to Logic is available through the Philosophy website. By taking advantage of site licences, students may run most relevant packages on their own PCs in college, or access them via the network on college machines.

4.5 Language Centre

Extensive facilities for language development for both curriculum and personal development purposes are available through the University's Language Centre.

4.6 Advice on course content and options

The main source of advice on course content and options will come from a student's college tutors. Other sources of information include extensive induction sessions provided by the Department of Mathematics and the Faculty of Philosophy and colleges, the course handbook and other information on the mathematics and philosophy websites.

4.7 Pastoral Support

Each college has an extensive support structure of tutors, advisors, welfare officers, peer support groups. Regular personal contact between students and tutors ensure that problems are addressed promptly. The University Counselling Service offers a range of assistance.

4.8 Criteria for Admission

Mathematics and Philosophy falls within the Mathematical Sciences Admissions Group, which has issued the following statement on criteria for admission. These criteria apply to:

- Mathematics
- Mathematics and Philosophy
- Mathematics and Statistics
- Computer Science
- Mathematics and Computer Science

and the criteria will be measured with full regard to their differing requirements.

Candidates will be invited for Interview and to take the Common Test while in Oxford (or just to take the Common Test if living outside Europe, though such candidates are free to choose to come for interview*) if their application gives evidence of the motivation and ability (including an appropriate mathematical background) to undertake what are demanding courses at one of the world's leading universities, sufficient to offer the possibility of final selection given the overall field of applicants.

(* Some candidates may live in parts of the world where the Admissions Office arranges interviews; sometimes colleges will arrange for candidates to be interviewed in their home countries. In the case of candidates whose first language is not English, an English language qualification (such as IELTS level 7 or equivalent) may form part of the admissions requirements.)

During the selection process, tutors will seek a demonstration of the skills and/or the aptitude necessary for the successful study of the course in question together with the motivation to undertake a demanding programme on that course, and will assess these via

- (i) the Common Test,

(ii) submitted written material in the case of those applying to read Mathematics and Philosophy and

(iii) iii. interviews (when held),

taking into account the level of existing relevant knowledge and experience.

Tutors will, in addition to assessing aptitude and technical skills, seek in successful candidates

(a) a capacity to absorb and use new ideas,

(b) the ability to think and work independently, and

(c) c. perseverance,

in each case to be assessed in respect of the course applied for.

Evidence of the extent to which these criteria have been met will be taken from the performance in i, ii (when relevant), and iii above, together with

(iv) past examination records, and]

(v) references and the personal statements contained both on the UCAS and on the Oxford Colleges application forms.

Candidates will also have the opportunity to present any special factors that they would wish to be considered.

An overall assessment of the strength of each candidate relative to the field of all applicants at this stage will normally be made by at least two colleges. Ultimate selection is necessarily competitive since the number of places is limited. However, through early identification during the interview process of strong candidates who may not gain places at their first or second choice colleges, the Mathematical Sciences Group takes active steps to ensure that (whenever possible) such candidates may be offered places at other colleges.

Applications for undergraduate places are made to the colleges of the University. Entrance is competitive and an offer of a place is made on the basis of a student's academic record, predicted results, recommendation of teachers, performance on a short test (normally) taken in Oxford on the day preceding interviews and on performance at interview. Arrangements are made for overseas students to sit the test abroad and to be assessed without attending for interview in Oxford.

The short test (2.5 hours) contains questions on core knowledge common to A-level syllabuses in Mathematics and is designed to be accessible to students who are studying for a single mathematics A-level. The aim of the test is to provide additional information on candidates, and is particularly valuable for those applicants who may not perform well in the interview situation, or whose mathematical background is unconventional.

The majority of applicants are invited to come for interview and are interviewed not only by tutors of the college of first choice but also by those in the college of second choice, and in a number of cases, several other colleges interview the applicants. The purpose of the interview is to determine those students, from an excellent cadre

of applicants, who might best benefit from the intensive, tutorially based learning methods. The overall assessments of a candidate (based on the candidate's academic record, recommendations of teachers, the test score and performance at interview) by both the first and second choice colleges are made available to all other colleges to facilitate the further consideration of promising candidates. This is done by storing information on test scores, college assessments and UCAS forms in an electronic database. This has proved to be a very valuable resource for promoting good practice towards ensuring that the best candidates are offered (mostly conditional) places. College cooperation extends to making a small number of Open Offers.

The vast majority of English students enter Oxford with at least 3 A grades at A-level, conditional offers are typically made at AAA level with variations to accommodate candidates taking a single mathematics A-level or a restricted range of Higher or SYS papers, also Scottish Highers and various Baccalaureates. Every effort is made to recognise potential in cases where data other than forecast grades suggests that predicted A-level grades may underestimate academic ability.

5 Methods for evaluating and improving the quality and standards of learning

Overall responsibility for the supervision of the course is vested in the Joint Committee for Mathematics and Philosophy, which comprises permanent members (the Professor and Reader in Mathematical Logic and the University Lecturer in the Philosophy of Mathematics) and two representatives each of the Mathematics Department and the Philosophy Faculty. The Mathematics Director of Undergraduate Studies may be co-opted by the Committee. Responsibility for the content and delivery of the mathematics part of the course rests with the Teaching Committee of the Department of Mathematics which is part of the Mathematical, and Physical and Life Sciences Division and for the philosophy part of the course with the Undergraduate Studies Committee of the Faculty of Philosophy which is part of the Humanities Division. The divisional boards have formal responsibility for the maintenance of educational quality and standards in their broad subject areas, and exercise their responsibility through their Academic Committees, and in particular the scrutiny they give to new course proposals and proposed course revisions, to reports from examiners, and to more general questions of academic policy.

Student feedback on (undergraduate) lectures and intercollegiate classes in Mathematics is encouraged by the distribution and collection of questionnaires during one of the lectures or classes in the middle or towards the end of a series. There is an additional slot for commenting on college provision of supporting tutorials and classes. Responses are anonymous. Space is provided for comments on aspects not covered by the questionnaire. Results are analysed statistically and the results, plus comments, relayed to the individual lecturers and class tutors. The Chairman of Mathematics, the Chairman of the Teaching Committee and the Faculty Teaching Advisor scrutinise the results, and discuss them with a designated undergraduate representative. The Chairman of the Teaching Committee uses the questionnaire results to identify where the lecturer, class tutor or graduate teaching assistant might need additional support. The Teaching Committee considers them when allocating lecture courses. Feedback from the questionnaires on the performance of lecturers in their initial years of appointment are made available to the Teaching Advisor, who will raise any apparent problem with the lecturer concerned. A summary of results is forwarded to the Teaching Committee and further action taken when appropriate. An annual report on intercollegiate classes is provided for the Chairman

of the Senior Tutors Committee.

Each faculty has a Joint Consultative Committees with Undergraduates, which meets termly to discuss student concerns. There is further student representation at the Faculty meetings, and a student representative (usually the chair of MURC) also sits on the Mathematics teaching Committee. From 2008/09 this is being piloted at the Department and Research Committees in Mathematics.

Student comments on tutorial provision are solicited by colleges and reviewed in ways which vary from college to college, typically by the Senior Tutor, Tutor for Undergraduates or Head of House.

Each term Tutors are invited to offer feedback on Mathematics lecture courses including information on how well their students tackled the problem sheets, collections and lecture courses overall, including how well each course builds on previous courses. This is reported to Teaching Committee and individual lecturers. General feedback of course questionnaires is given to Honour Moderation Lecturers to help guide subsequent courses for that year, and share good practice via the Moderations Co-ordinators Committee.

Proposals for syllabus and course reform are considered at termly meetings of the Joint Committee for Mathematics and Philosophy in consultation with the Teaching Committee of the Mathematics Department and the Undergraduate Studies Committee of the Philosophy Faculty.

Major revisions to the curriculum, which are normally initiated by one of the two faculties involved with the course, are widely discussed. It is usual for an ad-hoc committee to be established to prepare proposals for debate in the appropriate faculty.

There are regular procedures for monitoring and evaluation of courses, and the programme structure. Examiners reports are considered by the Joint Committee for Mathematics and Philosophy at the beginning of the academic year and, when appropriate, matters arising from them are referred to the Mathematics Teaching Committee or Philosophy Undergraduate Studies Committee. The syllabus, its presentation and student feedback are discussed in meetings of the relevant Committees and the faculties throughout the academic year.

New academic staff attend courses to train them in how to teach. These are organised by the Oxford Learning Institute (OLI), which has been set up within the University to carry out research into the training of university teachers as well as to supplement that research by employing the most effective methods of training. In addition, each new member of staff is assigned some more experienced member as 'mentor', who is responsible for giving advice and guidance on both teaching and research, especially during the first two years. Appointments are standardly made for five years in the first instance and a more formal review of the performance of new members of staff is conducted during the fifth year, with a view to determining whether re-appointment to the retiring age is appropriate.

The divisional board is also responsible for academic appointments and for the arrangements (including mentoring, appraisal, and reviews of performance) for the support of newly appointed lecturers and for monitoring their teaching competence

All teaching staff are encouraged to participate in staff development sessions run by the OLI and, where appropriate, the LTSN Centre for Mathematics, Statistics and Operational Research (particularly the national induction day for new staff) and sessions organised by the Faculty Teaching Advisor for Mathematics. The Mathematics Department runs a training programme for graduate students acting

as Teaching Assistants for the intercollegiate class scheme, and the OLI also runs courses for graduate students who are undertaking some undergraduate teaching.

Peer review of lecturing skill in mathematics has been introduced to be performed in three-five year cycles.

6 Regulation of Assessment

6.1 Examiners and the Examining Framework

The Joint Committee for Mathematics and Philosophy is responsible for the classification conventions for Mathematics and Philosophy within the framework for setting, checking and marking examinations established by the Teaching Committee of the Department of Mathematics (for examinations in mathematics) and the Faculty Board of Philosophy (for examinations in philosophy).

The examinations are conducted by a small Board of Examiners appointed by the Mathematics Nominating Committee and the Philosophy Faculty Board; an important feature is that its internal members are formally independent of the course lecturers and tutors. The Boards of Examiners, under their elected Chairs, are responsible for the setting of all papers, and marking of scripts. The Board appoints Assessors to assist in setting and marking papers, and may consult with or seek draft questions from the course lecturers. In Mathematics the Assessors generally are the course lecturers. Candidate numbers are used to ensure anonymity.

At the conclusion of the examination, the Board of Examiners makes a detailed written report giving overall statistical information, new examining methods and procedures, and changes under consideration; and also giving detailed commentary on each paper, usually on a question-by-question basis.

Each examination board has at least one External Examiner members appointed by the Vice Chancellor, to act as impartial advisor and in particular

- to verify that standards are appropriate to the award, in part by comparison with the standards of comparable institutions, and to ensure that the assessment procedures and the regulations governing them are fair and otherwise appropriate;
- to ensure that the process of the examination and the determination of the awards has been fairly conducted, and that the individual student performance has been judged in accordance with the regulations and conventions of the Examining Board. (This will entail signing the Class List as an endorsement that the process of examination and classification has been fairly conducted.)

Each External Examiner is expected to report annually to the Vice-Chancellor, covering the following points:

- whether the standards are appropriate for the institution's award;
- the standards and comparability of student performance in the programmes concerned;
- the extent to which procedures for assessment, examination and the determination of awards are sound and have been fairly conducted.

The report of the Board of Examiners, and of each External Examiner is addressed to the Vice-Chancellor and considered by the Academic Committees of the Mathematical, Physical and Life Sciences Divisional Board and the Humanities Board, and by the Educational Policy and Standards Committee of the University.

The reports are also considered in detail by the Joint Committee for Mathematics and Philosophy, whose responsibility it is to ensure that full consideration is given to any particular criticism or suggestion made by an External Examiner, and to institute further discussion or action, and to inform the External Examiner within a reasonable time of what is done.

The reports of the Examiners and of the External Examiners are conveyed to the members of the Faculty of Mathematics and the Faculty of Philosophy, and the Joint Consultative Committees with Undergraduates.

The examination papers, and the detailed reports of the Board of Examiners are made available to all students (and others) on the departmental website.

6.2 Assessment Rules and Classification

- The marking conventions established by the Mathematics Teaching Committee and the Philosophy Faculty Board and the classification conventions established by the Joint Committee for Mathematics and Philosophy are published by the Joint Committee in the Course Handbook and its supplements.
- For the purposes of the final classification, the four papers taken at the end of the first year do not count.
- Classification is based on three papers taken at the end of the second year, six papers or their equivalent at the end of the third year, and three papers or their equivalent in mathematics or four papers in philosophy or one and a half papers in mathematics plus two papers in philosophy at the end of the fourth year, or their equivalent.
- The performance of each candidate on each paper/module is reported in the form of a Standardised Mark for that paper/module:

70 – 100 :	<i>First Class per performance on paper</i>
60 – 69 :	<i>Upper Second Class per performance on paper</i>
50 – 59 :	<i>Lower Second Class per performance on paper</i>
40 – 49 :	<i>Third Class per performance on paper</i>
30 – 39 :	<i>Pass per performance on paper</i>
0 – 29 :	<i>Fail per performance on paper</i>

The Qualitative class descriptors for these levels of performance in mathematics and in philosophy are set out in the Course Handbook; in summary:

Mathematics

First Class: 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.

Upper Second Class: 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.

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

Third Class: 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.

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

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 questions attempted are likely to be fragmentary only.

In relation to the subject benchmark standards we would say "threshold" would be likely to be associated with a third class and "typical" would refer to the II.1/II.2 boundary.

Philosophy

First class script: work displaying analytical and argumentational power, with good command of the facts and/or arguments relevant to the questions and evidence of ability to organise them with clarity, insight and efficiency;

Upper second class script: work displaying analytical power and argumentation of the quality associated with a First, but with less comprehensive and thorough command of evidence. Or work showing considerable thoroughness but less analytical skill or less clarity in organisation;

Lower second class script: competent work with no major defects, but giving an incomplete account of the question, or marred by inaccuracies. Or work which demonstrates lapses in (but does not lack) analytical and argumentational skills;

Third class script: work that is generally weak with muddled argumentation, but containing some evidence of knowledge of facts and analytical skill. Or work that, while competent and knowledgeable in itself, does not address the question asked by the examiners.

Pass Degree Script: very poor quality work, showing only slight evidence of having studied.

Fail Script: work of such a low standard that it cannot even be given a Pass mark.

6.3 Classification conventions

- The classification is based on the averages of the standardised marks on all papers, all mathematics papers and all philosophy papers.
- No candidate is given a classification lower than the average of the standardised marks on all papers.
- Where a candidate's average standardised marks in mathematics and in philosophy differ by one class, then the candidate is awarded the higher class

provided that the number of papers in the higher subject is not the minimum permitted in that subject and the margin by which their average subject marks exceed the borderlines is greater than a threshold value specified by the Joint Committee for Mathematics and Philosophy. The examiners may make a small modification to the threshold value provided that their decision is unanimous and the change is recorded in their report.

7 Indicators of quality and standards

- QAA Subject Reviews in 2000 (Mathematics) and in ?? (Philosophy) achieved excellent grading

	Mathematics	Philosophy
CDCO:	4	4
TLA:	3	4
SSG:	4	4
SPA:	4	4
LR:	4	4
QME:	4	4

- The reports of External Examiners regularly address issues of quality and standards.
- The annual returns on First Destinations of Graduates demonstrate the success graduates from the Mathematics and Philosophy course enjoy in the job-market, and in obtaining admission to graduate courses.
- Mathematics Departmental Review (by the MPLS Division) in 2004 and follow-up
- The Department of Mathematics and the Faculty of Philosophy each has its own External Advisory Panel, whose members are senior figures in the subject from other universities (including universities in other countries) and from industry and from government. These Panels meet from time to time to offer advice on how best to meet changing situations both within and outside this University.
- The Philosophy Faculty underwent review by the Educational Policy and Standards Committee of Council at the end of Michaelmas Term 2002.
- Historic data pertaining to class distributions, comparison with the MPLS and Humanities Divisions, and within the University and with other Russell group Mathematics programmes.