M.Sc. in Mathematical Modelling and Scientific Computing

Examination Conventions 2026–27

1 Introduction

Examination conventions are the formal record of the specific assessment standards for the course or courses to which they apply. They set out how examined work will be marked and how the resulting marks will be used to arrive at a final result and classification of an award. This document sets out the examination conventions for the M.Sc. in Mathematical Modelling and Scientific Computing for the academic year 2026–27. These examination conventions are approved annually by the Supervisory Committee for the M.Sc. in Mathematical Modelling and Scientific Computing and by the Graduate Studies Committee in the Mathematical Institute. The Board of Examiners may only make minor deviations from these conventions in exceptional circumstances and only after the consent of the Proctors. This document is in all ways subsidiary to the current:

- Examination Regulations;
- Examinations and Assessment Framework.

2 Examiners

The board of examiners will consist of four internal members and one external examiner. The examiners will appoint assessors to help with the assessment of the course. The internal examiners for the academic year 2026–27 will be Professor Mike Giles (Chair), Professor Mohit Dalwadi, Professor Elizaveta Rebrova, and Professor Peter Robin Thompson, and the external examiner will be Professor David Hewett from University College London.

Candidates should not, under any circumstances, seek to make contact with individual internal or external examiners about any matters relating to the examination of the course.

3 Course Requirements

All students will complete 12 units. Students who wish to may take either one, two, or three extra units as described below.

Marks for each unit will be given in terms of USMs (University Standardised Marks) out of 100 with the conventions: 0-49 fail; 50-64 pass; 65-69 merit; 70-100 distinction.

The 12 units that all students will take and be assessed on are:

- two written examinations on core courses in mathematical methods (1 unit each);
- two out of three written examinations on core courses in numerical analysis (1 unit each);
- one special topic based on a modelling/methods lecture course (labelled [M]) (1 unit);
- one special topic based on a computing lecture course (labelled [C]) (1 unit);
- one case study in mathematical modelling (1 unit);
- one case study in scientific computing (1 unit);
- one dissertation and viva (4 units).

The extra units that students may take are:

- the third written examination on a core course in numerical analysis;
- one or two further special topics.

In all cases, a student's final USM, USM*, will be a weighted average of the 12 units that all students will take. In the case a student takes the third written examination on a core course in numerical analysis, the best two marks on the numerical analysis examinations will contribute to USM*, and in the case a student takes one or two extra special topics, the best mark for an [M] special topic and the best mark for a [C] special topic will contribute to USM*. Any values of USM* with decimals of 0.5 and above will be rounded up to the nearest whole number, and any values of USM* with decimals below 0.5 will be rounded down to the nearest whole number. This integer value of USM* will be used for classification as described in Section 4 below. We refer to the individual USMs which contribute to USM* as "contributing USMs".

4 Classification

Students will be awarded a distinction if they fulfil all the following criteria:

- USM$^\star \geq 70$;
- All contributing USMs ≥ 50;
- Dissertation and Viva USM ≥ 65.

Students who are not awarded a distinction will be awarded a merit if they fulfil both of the following criteria:

- USM$^\star \geq 65$;
- At least 11 contributing USMs ≥ 50.

Students who are not awarded a distinction or merit will be awarded a pass if they fulfil both of the following criteria:

- USM$^\star \geq 50$;
- At least 9 contributing USMs ≥ 50.

Students who are not awarded a distinction, merit, or pass will fail the course.

Note that USMs for units over the required 12 do not contribute to USM* and have no effect on the classification of the degree.

Candidates who fail the requirements of the MSc will be permitted to resit each of the assessment(s) which they failed on not more than one occasion. This resit attempt shall normally be taken at the next opportunity, but may be deferred once, i.e. it must be taken at one of the next two opportunities. In such a case a student will not be eligible for a merit or distinction on the whole course. The examiners will specify at the time of failure which of the assessed components of the course may or must be redone. A candidate who resits a unit for which a technical fail mark was originally awarded (a unit for which no work was submitted or a written examination was missed without excusal) will have the mark for the resit of that unit capped at 50.

If a student fails one particular unit, there is no provision for the candidate to resit that unit during the same academic year.

5 Class Descriptors

Qualitative class descriptors for the levels of performance are summarised below.

Distinction: High quality work throughout the course. The candidate shows excellent knowledge of the material over a wide range of topics. The criteria for USMs in the distinction band are:

- 90-100: The candidate shows remarkable ability and true insights. In particular, dissertations in this band will be worthy of publication without the need for further mathematical investigation and without the need for significant re-writing of the text.
- 80-89: The candidate shows outstanding problem-solving skills and outstanding knowledge of the material over a wide range of topics, and is able to use that knowledge innovatively and/or in unfamiliar contexts.
- 70-79: The candidate shows excellent problem-solving skills and excellent knowledge of the material over a wide range of topics, and is able to use that knowledge innovatively and/or in unfamiliar contexts.

Merit: The candidate shows very good quality of work throughout the course. Candidates who achieve a merit will have demonstrated very good problem solving skills and knowledge

over a wide range of topics, or excellent command of some material and good command of the rest.

Pass: The pass covers a wide range of results from candidates who show adequate knowledge of most of the material to candidates who show good or very good knowledge of much of the material over a wide range of topics. The criteria for USMs in the pass band are:

- 60-64: The candidate shows good or very good problem-solving skills, and good or very good knowledge of much of the material over a wide range of topics.
- 50-59: The candidate shows basic problem solving skills and adequate knowledge of most of the material.

Fail: The candidate shows inadequate grasp of the basic material. Candidates may have shown some understanding but the majority of work is likely to show major misunderstanding and confusion, and/or inaccurate calculations.

- 40-49: The candidate shows reasonable understanding of at least part of the basic material and some problem solving skills. Although there may be some good work, the majority of work will contain errors in calculations and/or show incomplete understanding of the topics.
- 30-39: The candidate shows some limited grasp of basic material over a restricted range of topics, but with large gaps in understanding. There need not be any good quality work, but there will be indications of some competence.
- 0-29: The candidate shows inadequate grasp of the basic material. The work is likely to show major misunderstanding and confusion.

6 Individual Units of Assessment

Once a piece of work has been submitted, it cannot be withdrawn. Below is a description of the different units on the course and how they are assessed.

Core Courses (1 unit each) The core courses will be taught in Michaelmas and Hilary terms and will be assessed by in person handwritten examinations in Trinity term. There are two core courses in mathematical methods and students must complete both. There are three core courses in numerical analysis and students must complete at least two of these.

Written examinations will be of one hour and 45 minutes duration and consist of three questions, each worth 25 marks. Students may submit answers to as many questions as they wish, but only the best two answers will count towards the final mark for the paper. Each question should be divided into two to four parts and an indication of the raw marks available for each part of each question should be given on the question paper. Exam scripts are marked according to an approved marking scheme and these scripts are independently checked to ensure that all parts have been marked and that the marks have been correctly totalled and recorded. A mark of zero will be recorded for any part or parts of questions that have not been answered but which should have been answered. The examiners exercise their academic judgment to recalibrate the raw marks to arrive at USMs as described in Section 16 of this document.

Special topics (1 unit each) Each student must complete at least one special topic in the area of Modelling/Methods [M] and at least one in the area of Computation [C]. Special topics are assessed by mini-projects of approximately 15 pages in length (up to a maximum of 20 pages without penalty, see Section 12) which are independently marked by two assessors, usually the course lecturer and another member of faculty. These two marks are then reconciled as described in Section 7. The final USMs are then awarded by the examiners based on the reconciled raw marks. Students who have studied in Oxford previously may not undertake a special topic based on a lecture course on which they have been assessed during their previous degree course.

Case Studies in Mathematical Modelling and in Scientific Computing (1 unit each) Each student must do one mathematical modelling case study and one scientific computing case study.

Each scientific computing case study involves about five weeks of group work, further personal study and an individual written report. The report can be up to 20 pages without penalty. The report is independently marked by two assessors, usually the lecturer and another member of faculty. A mark out of 75 is awarded for the write-up of the group work and a mark out of 25 is awarded for the write-up of the student's individual extension. (If the student has not extended the project, they are given a mark of zero for this part of the project.) These marks are then reconciled as described in Section 7.

Each mathematical modelling case study involves about 5 weeks of group work, a group oral presentation and an individual written report. The report can be up to 16 pages without penalty. The presentations are given a mark out of 20 (agreed by at least two assessors) and the reports are marked out of 100, normally by the course convenor and the group leader (or another member of faculty if these are the same person). The reconciled mark for the written report is then multiplied by 0.8 and added to the presentation mark to give a raw mark for the unit.

Marks with decimals of 0.5 and above will be rounded up to the nearest whole mark, and marks with decimals below 0.5 will be rounded down. The final USMs for the case studies are awarded by the examiners based on the recommended and reconciled raw marks.

Dissertation and viva (4 units) The main body of the dissertation should normally be 40–50 pages long including figures and tables, and need not necessarily contain original research. Dissertations which exceed 50 pages will be subject to penalties (see Section 12 for more information). The dissertation must have an abstract at the beginning. The dissertation is read and marked by two internal assessors, neither of whom is the student's supervisor. The dissertations of a number of students, typically including a selection of those at the pass/fail or merit/distinction borderlines, are also read by the external examiner. All students will also be examined viva voce. The assessors for the viva voce examination will be the assessors who have read the dissertation. The supervisors will propose a 10 mark range for the dissertation along with a statement of justification for this range which the exam board will take into account when confirming the final mark. The assessors for each dissertation will have a discussion to try to agree a final mark for the dissertation. However, if they are unable to agree a mark, the decision will be referred to the other examiners. The USM marks will include credit for originality and performance in the viva.

Agreed final marks for individual units of assessment will be expressed using the scale shown in Table 1 below.

Mark Range	Classification
70–100	Distinction
65–69	Merit
50–64	Pass
0–49	Fail

Table 1: Classification for individual units of assessment.

7 Reconciliation of Special Topic and Case Study Marks

Special topics and case studies are independently marked by two assessors. If the assessors' marks do not differ by more than 10, the final mark will usually be the average of the two marks (rounded up to the nearest whole mark if necessary). However, if the marks are on opposite sides of the pass/fail borderline or differ by more than 10 marks there will be further discussion between the assessors in order to try to reach a decision on a final mark. In the unlikely event the two assessors are unable to agree on a mark the examiners will be consulted and, if necessary, a third assessor appointed in order to help make a final decision on the mark.

8 Usage of Formative Feedback

Those who mark the case studies and special topics are encouraged to give comments providing constructive feedback on the projects they marked. After being approved by the Chair of Examiners on behalf of the Examination Board, and after the results have been released, this feedback is passed on to the students in the hope it will help them to improve future project work. In addition students will receive feedback on their dissertations after the final results have been released. Students will also receive feedback on non examined work during the first two terms. This will take the form of comments on students' solutions to problem sheets submitted for the core courses.

9 Examination Conduct

Students will receive advice from the examiners before each set of examinations and submissions in the form of Notices to Candidates. These notices provide information on submission of projects, as well as the conduct of the examinations, including practical arrangements and procedures in the case of illegible or incomplete scripts and illness. Notices from examiners can be found on the Mathematical Institute's course website at:
https://www.maths.ox.ac.uk/members/students/postgraduate-courses/msc-mmsc.

It is necessary to wear sub fusc for both the written examinations and the viva voce examinations.

10 Penalties for Non-Attendance

Rules governing non-attendance at examinations and any consequent penalties are set out in full in the Examination Regulations (Regulations for the Conduct of University Examinations, Part 14). If a student will be prevented by illness or other urgent cause from sitting one of their examinations they should contact their college office or college advisor as soon as possible. Any case of non-attendance at an examination involving illness or other medical condition will require written medical evidence and will usually be referred by the college to the Proctors.

If the Proctors do not believe there are satisfactory reasons for non-attendance, or an application to the Proctors has not been submitted, a candidate will be awarded a mark of zero for that examination. The mark for any resit of the examination will be capped at 50. Such a resit is only available once to candidates who initially fail the whole M.Sc. course.

11 Penalties for Late Submission of Coursework

Late submission of coursework for the M.Sc. in Mathematical Modelling and Scientific Computing (this includes case studies, special topics and the dissertation) is a serious matter and will usually result in academic penalties unless prior permission for late submission has been given by the Proctors. In the absence of such Proctorial permission, academic penalties will be as set out in Table 2 below. (Note that if the late submission penalty is higher than the mark for the submission, a candidate will be awarded a mark of zero.)

Lateness of submission	**Penalty (USMs)**
Up to 4 hours	1
4–24 hours	10
24–48 hours	20
48–72 hours	30
72 hours – 14 days	35
More than 14 days	fail (mark of 0 awarded)

Table 2: Penalties for late submission of special topics, case studies and dissertations.

Where no work is submitted, the Proctors may decide not to permit the candidate to continue on the M.Sc. course. If the Proctors permit the candidate to continue on the M.Sc. course, a mark of zero will be awarded for that particular piece of work. The mark for any resit of the assessment will be capped at 50. Such a resit is only available once to candidates who initially fail the whole M.Sc. course.

12 Formatting of Projects and Penalties for Submissions Exceeding the Page Limits

For special topics and case studies in scientific computing the page limit is 20 pages, and for case studies in mathematical modelling the page limit is 16 pages. This page limit includes the whole main body of the special topic or case study (i.e. all text, mathematical equations, figures, tables, abstract, table of contents etc.) but excludes the references, title page (unless this contains more of the project than just the title and student's candidate number), and the appendices. Whilst assessors are required to consider the main body of the report, they are not expected to read appendices, so all core analysis and findings should be presented within the main body of the document. A minimum of a 12pt font size must be used, the width of the text should be at most 15cm (6 inches) per page and the height of the text should be at most 22.5cm (9 inches) per page. The spacing of the text should be at least one and a quarter spacing (use a baselinestretch of 1.25 in LaTeX). The examiners may request the original LaTeX source file if they do not believe these restrictions have been adhered to.

The final dissertation should usually be 40–50 pages in length excluding front matter (title page, abstract, acknowledgements, table of contents), and references, but including figures and tables. Appendices are also excluded from the page limit, however, as for special topics and case studies, examiners are not expected to read appendices. Details of font sizes, margins etc for the dissertation are the same as for special topics and case studies, and the OCIAM thesis class for LaTeX (which can be downloaded from https://www.maths.ox.ac.uk/members/it/faqs/latex/thesis-class) is recommended.

Submissions exceeding the pages limits will be assessed in the usual way and then penalties applied as indicated in Tables 3 and 4 below.

Number of pages in excess of limit for special topics and case studies	**Penalty (USMs)**
1 page	1
2 pages	5
3 pages	10
4 pages	20
5 pages	30
6 pages	40
7 pages or more	50

Table 3: Penalties for special topics and case studies exceeding the page limit.

13 Alternative Examination Arrangements and Mitigating Circumstances Notices to Examiners

A candidate in any University Examination with specific learning difficulties or disability/illness may apply through the Senior Tutor of their college for alternative examination arrangements

Number of pages in excess of limit for dissertation	Penalty (USMs)
1–2 pages	1
3–4 pages	5
5–6 pages	10
7–8 pages	20
9–10 pages	30
11–12 pages	40
13 pages or more	50

Table 4: Penalties for dissertations exceeding the page limit.

relating to their condition. See http://www.ox.ac.uk/students/academic/exams/examination-adjustments for further information on the process.

Candidates who would like the examiners to be aware of any mitigating circumstances that may have affected their performance before or during an examination are advised to discuss their circumstances with their college and consult the Examination Regulations (Part 13) [see https://examregs.admin.ox.ac.uk/Regulation?code=rftcoue-p13mcntoexam]. Students should then submit a Mitigating Circumstances Notice to Examiners through Student Self-Service and this will be forwarded to the relevant chair of examiners.

A candidate's final outcome will first be considered using the classification rules/final outcome rules as described above. The exam board will then consider any further information they have on individual circumstances.

For further details see https://www.ox.ac.uk/students/academic/exams/problems-completing-your-assessment, and in particular the student guide to MCE which can be found at this link. Some examples of mitigating circumstances that may have impacted a student's performance in an examination or during the preparation of coursework include acute illness or unforeseen circumstances such as a traffic accident or bereavement.

14 Plagiarism

All the assessors for the course will be alert to the possibility of plagiarism in written reports. If an assessor, or a Turnitin report generated in the course of examination procedures, raises concerns about the proper attribution of a passage or piece of submitted work, the matter will be reported to the Chair of Examiners. If the extent of the material affected is a small proportion of the whole (usually under 10%), this will be dealt with by the board of examiners. More serious cases will be referred to the Proctors.

Where the Chair finds that the matter can be dealt with by the Board, assessors will mark the work on its academic merits. The Board will then deduct marks for derivative or poorly referenced work. Boards are free to operate marks deductions of between 1 and 10% (maximum) of the marks available for that particular piece of work.

15 Use of Artificial Intelligence

The department encourages the experimentation with, and confident use of, generative artificial intelligence (Gen AI) tools. However, their usage must be declared in the same way that existing literature or available software has to be referenced adequately. When you submit your special topic and case study reports and your dissertation, you must also complete a form declaring your use of AI as detailed in the departmental policy for students on the use of generative AI in summatively assessed work, available from https://www.maths.ox.ac.uk/members/students/departmental-and-university-regulations.

16 Scaling of Examination Marks

The Examiners may choose to scale marks for the written examinations where, in their academic judgement:

(a) a paper was more difficult or easy than in previous years, and/or

(b) a paper was more or less difficult than other papers taken by students in a given year, and/or

(c) a paper has generated a spread of marks which are not a fair reflection of student performance on the University's standard scale for the expression of agreed final marks, i.e. the marks do not reflect the qualitative marks descriptors.

Such scaling is used to ensure that candidates' marks are not advantaged or disadvantaged by any of these situations. In each case, examiners will establish if they have sufficient evidence for scaling. Scaling will only be considered and undertaken after marking of a paper has been completed, and a complete set of marks for all papers undertaken at a given exam sitting is available.

If it is decided that it is appropriate to use scaling, the examiners will review a sample of papers on either side of the classification borderlines to ensure that the outcome of scaling is consistent with academic views of what constitutes an appropriate performance within each class.

Appendices

A Criteria for Individual USMs

A.1 Criteria for Special Topic and Case Study USMs

90–100: Work of potentially publishable standard, as evidenced by originality or insight. The work should show depth and accuracy, and should have a clear focus.

80–89: Work in this range will be at the level of a strong candidate for a DPhil applicant. It will have depth, accuracy and a clear focus. It will show a strong command of material. It may contain original material, which may take the form of new examples, new calculations, or new mathematical propositions, for example.

70–79: The work submitted is of a generally high order, with depth, clarity and accuracy, but may have minor errors in content and/or deficiencies in presentation.

60–69: The candidate shows a good grasp of their subject, but without the command and clarity required for distinction level marks. Presentation, referencing and bibliography should be good, and the mathematics should have no more than minor errors.

50–59: The work shows an adequate grasp of the subject, but is likely to be marred by having material at too low a level, by serious or frequent errors, a high proportion of indiscriminate information, or poor presentation and references.

40–49: The candidate shows reasonable understanding of parts of the basic material, but reveals an inadequate competence with others. The material may be at too low a level. There are likely to be high levels of error or irrelevance, muddled or superficial ideas, or very poor writing style.

30–39: The candidate shows some limited grasp of at least part of the material.

0–29: Little evidence of understanding of the topic. The work is likely to show major misunderstanding and confusion.

A.2 Criteria for Dissertation USMs

90–100: The candidate shows remarkable ability and true insights. The dissertation shows considerable evidence of original thought and is very well presented with no important deficiencies. Dissertations in this band will be likely to be worthy of publication without the need for further mathematical investigation and without the need for significant re-writing of the text.

80–89: Work in this range will be at the level of a strong candidate for a DPhil applicant. It will have depth, accuracy and a clear focus. It will show a strong command of material at least at the MSc level. It is likely to contain original material, which may take the form of new mathematical propositions, new examples, or new calculations, for example.

70–79: The candidate shows excellent problem-solving skills and excellent knowledge of the area of their dissertation. The dissertation shows evidence of original thought and is well presented.

60–69: The candidate shows a strong overall performance but with some weaknesses. Typically the work has been carried out and presented and analysed reasonably well, especially at the merit level.

50–59: The candidate has performed satisfactorily but there are weaknesses in the dissertation. Although there will be some good work in the dissertation, typically there will be some flaws and there will be little evidence of originality.

40–49: The candidate has not performed satisfactorily. Although there may be some good work in the dissertation, either there will be significant errors or the content will be insufficient.

30–39: The candidate has performed poorly. There need not be any good quality work in the dissertation, but there will be indications of some competence.

0–29: A dissertation in this band is likely to contain little or no meaningful content.

B Protocol for Setting Examination Papers

Each paper should be drafted by the appropriate lecturer, and checked by a qualified person.

C Form of Questions

Each question will be marked out of 25 and should be divided into two to four parts. An indication of the raw marks available for each part of each question should be given on the question paper.

C.1 Checklist for Setters and Checkers

Those who are asked to supply draft exam questions will be provided with a checklist of important considerations.

1. Is the question on the syllabus (as in the Exam Regulations or Course Handbook (including the lecture course synopses))?
2. Is the mathematics correct?
3. Is the notation and terminology standard/obvious/defined? (Standard usage from the course is acceptable without explanation but phrases such as "as in the lectures" should be avoided.)
4. Is the question unambiguous? Is it clear what may be assumed, what detail is required, and what would constitute a complete answer?
5. Is the form of presentation familiar/inviting/readable?

6. Does each question have an easy start, worth around 10 marks, which might be readily and routinely completed? This should not wholly be testing memory of previous material explicitly seen.
7. Is there material designed to differentiate at the class borderlines?

   (i) To achieve a USM of 60, is there a part that tests understanding of standard concepts/techniques (whilst still being rather straightforward) which tests whether a candidate can do any more than merely reproduce the bookwork verbatim?

   (ii) To achieve a USM of 70, is there a part for which a full solution requires truly excellent understanding and skill?
8. Would a candidate with a USM of 60 on average achieve around 13/25 marks for the question? Is a mark of 20+ unlikely to be achieved by a significant number of candidates who are not of distinction standard?
9. Is it the case that only exceptional students are capable of gaining full marks? Note that a USM of under 50 on a paper means an academic fail of that paper. This alone will not lead to overall failure of the masters course, but a student who fails one paper may not be awarded a distinction overall.
10. Is each question overall of a straightforward character?
11. Are the questions as a whole fairly spread across the syllabus?
12. Are the questions of comparable difficulty to one another?
13. Are the questions sufficiently different from those set in recent years?
14. Is the question formatted using the oxmathexam.cls file?
15. Does the question, adequately spaced, fit on a single page?

C.2 Marking Schemes and Model Solutions

Assessors setting questions should be asked to provide complete model solutions indicating everything that a candidate would be expected to write to answer the question fully. The model solutions and marking scheme need to be sufficiently clear and comprehensive to be meaningful to an external examiner. Those setting questions should be aware that solutions may be released to students in the future.

The model solution for each question should be accompanied by a marking scheme out of 25. The marking scheme should aim to ensure that the following qualitative criteria hold:

- **20–25 marks:** A completely, or almost completely, correct answer, showing excellent understanding of the concepts and skill in carrying through the arguments and/or calculations; minor slips or omissions only.
- **13–19 marks:** A good though not complete answer, showing understanding of the concepts and competence in handling the arguments and/or calculations, and some evidence of problem-solving ability. Such an answer might consist of an excellent answer to a substantial part of the question, or a good answer to the whole question which nevertheless shows some flaws in calculation or in understanding or in both.
- **7–12 marks:** Standard material has been substantially and correctly answered with some possible minor progress on to other parts of the question.

- **0–6 marks:** Some progress has been made with elementary, accessible material.

Assessors should classify the parts of each question under the headings:

- **B1:** bookwork material: explicitly seen before;
- **B2:** routine material: easily synthesized from material explicitly seen before;
- **S:** similar to material seen before;
- **N:** new rider demanding good command of concepts and/or methods.