

Department of Mathematics: Examination Conventions 2011–12

Moderations Examinations in Mathematics

1 Introduction

This document sets out the examination conventions for **Honour Moderations Examinations** in Mathematics. The first part of this document is written explicitly for candidates; the second part of the document contains additional information for Assessors and Examiners but will also be of interest to candidates. The Academic Committee of the Department of Mathematics directs that the Honour Moderations Examinations are in accordance with these conventions. The Board of Examiners may only make minor deviations from these conventions in exceptional circumstances and only after the consent of the Academic Committee or the Proctors. This document is in all ways subsidiary to the current:

- *Examination Regulations*
- *Notes for Guidance of Examiners and Chairmen of Examiners*
- *Notes of Guidance on Examinations and Assessment*

2 Examinations

To qualify for your BA in Mathematics or MMath you must pass a First and a Second Public Examination. The First Public Examination in Mathematics is currently called Honour Moderations and is taken at the end of the first year. There is also a resit examination, the Preliminary Examination in Mathematics, which may be taken by candidates who fail to satisfy the Moderations Examiners. Candidates who are prevented from sitting Honour Moderations by illness or other exceptional circumstances may seek permission from the Proctors instead to sit the Preliminary Examination in Mathematics.

The Second Public Examination has three parts: Part A taken at the end of the second year, Part B taken at the end of the third year and Part C taken at the end of the fourth year. Candidates who satisfy the examiners in Part

A and Part B but not Part C qualify for the award of BA in Mathematics; candidates who satisfy the examiners for all three parts qualify for the award of the MMath. Only candidates who achieve an Upper Second Class or better standard on Parts A and B together qualify to proceed to Part C.

3 Moderations

All Mathematics candidates take four examination papers, as follows:

1. Pure Mathematics I
2. Pure Mathematics II
3. Applied Mathematics I
4. Applied Mathematics II

and submit two MuPAD projects.

The paper **Applied Mathematics I** is divided into two sections: (i) Calculus of One Variable and Dynamics, and (ii) Calculus of Two or More Variables and Probability. Four questions will be set on each section and candidates are instructed that they should not submit answers to more than five questions in all and not more than three questions from either section. The paper **Applied Mathematics II**, as in previous years, contains questions on Fourier Series and 2 Variable Calculus, PDEs, Calculus of 3 Variables and will also contain a question on Statistics.

3.1 University Standardised Marks

Marks for each individual examination paper 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 is as follows:

- 70-100: First Class
- 50-69: Second Class
- 40-49: Third Class
- 30-39: Pass
- 0-29: Fail

These marks reflect the qualitative descriptors given in appendix ??.

Marks for formally assessed course work will be similarly standardised.

Honour Moderations is a classified examination and the overall class is calculated from the USMs for individual papers according to the following. Weighted averages are calculated hence, first including the MuPAD USM and then second without.

$$Av_1 = \frac{PMI + PMII + AMI + AMII + \frac{1}{4}MM}{4\frac{1}{4}},$$

$$Av_2 = \frac{PMI + PMII + AMI + AMII}{4},$$

each symmetrically rounded. [62.49 will be rounded down to 62.50 would be rounded up]

Classes in 2011/12 will be awarded according to the following conventions:

First Class: $Av_1 \geq 70$ and $Av_2 \geq 70$

Second Class: Not satisfying the conditions for a First Class and both $Av_1 \geq 50$ and $Av_2 \geq 50$

Third Class: Not satisfying the conditions for a Second Class and both $Av_1 \geq 40$ and $Av_2 \geq 40$

Pass: Not satisfying the conditions for a Third Class and $Av_2 \geq 30$

Fail: $Av_2 < 30$

In addition, no student shall be awarded a Pass or Honours unless they score at least 30 on each of the four papers.

4 MuPAD in Moderations

Marks for MuPAD will be communicated to the Moderators early in Trinity Term. The raw MuPAD marks will consist of two marks out of 20 but will be incorporated into the average Moderations USM as a mark out of 25, that is, as the equivalent of a quarter of a paper.

5 Penalties for Late Submission

The Examination Regulations stipulate specific dates for submission of the required pieces of coursework to the Examiners (this includes MuPAD projects and in later years History of Mathematics coursework, Mathematics Education Undergraduate Ambassadors Scheme coursework, Extended essays, Structured Projects and Dissertations.) Rules governing late submission and any consequent penalties are set out in the ‘Late Submission of Work’ sub-section of the ‘Regulations for the Conduct of University Examinations’ section of the Examination Regulations 2011 on page 46.

Late submission of coursework for Mathematics examinations will normally result in the following penalties:

- With permission from the Proctors under clause (2) of para 16.8, page 46, no penalty.
- With permission from the Proctors under clauses (3) + (4) of para 16.8, a penalty of a reduction in the mark for the coursework in question of at least 5 USMs (or at least 5% of the maximum mark available for the piece of work); the exact penalty to be set by the Examiners with due consideration to the advice given in the document ‘Academic Penalties for Late Submission of a Thesis or Other Exercise: Proctors Notes for Guidance’, dated 1/11/06.
- Where no work is submitted or it is proffered so late that it would be impractical to accept it for assessment the Proctors may, under their general authority, and after (i) making due enquiries into the circumstances and (ii) consultation with the Chairman of the Examiners, permit the candidate to remain in the examination. In this case, the Examiners will award a mark of zero for the piece of coursework in question.
- Where the candidate is not permitted by the Proctors to remain in the examination he or she will be deemed to have failed the examination as a whole.

6 Examination Conduct

Candidates will be sent a “Notices to Candidates” letter. You may view a specimen in appendix ??.

7 Special Needs Candidates

A candidate in any University Examination with special examination needs may apply to the Proctors through the Senior Tutor of his or her college

- (1) for special examination arrangements relating to his or her condition and
- (2) for the condition to be taken into account by the examiners as a special factor that may affect his or her performance in examinations.

For further details on the general rules for candidates with special candidates examination needs refer to the University's Examination Regulations.

8 Preliminary Examination

Examiners are reminded that the 'Preliminary Examination', held at the end of the long vacation, is intended for candidates who clearly need to do more work before proceeding to the second year, as well as candidates who, for some good reason, are unable to sit Moderations.

The Preliminary Examination consists of two papers; one in Pure Mathematics and one in Applied Mathematics. This is an unclassified examination. There are 8 questions on each paper, candidates should answer 7. To pass the examination, a student must achieve a USM of at least 40 on each of the two papers and demonstrate understanding of sufficient breadth to satisfy the Examiners.

Appendices

Further Information for Examiners

A Arrangements for the Examination

Examinations are usually held at Ewert House, Summertown. Please ensure you arrive at Ewert House in good time.

You must bring your university card with you and display the card photo side up throughout each examination. You may take your writing equipment into the examination room and your individual timetable sent to you by the Examination Schools, provided you have not written on it or otherwise modified it. Candidates are permitted to take non-carbonated water in a spill proof bottle into the examination room. Nothing else may be taken into the examination room, unless you have permission from the Proctors. Please note that mobile phones may not be taken into the examination room.

Desks will be arranged in numerical order and seating charts will be displayed throughout the reception area as well as outside individual examination rooms and will show candidate and desk numbers. On reaching your desk you should

check that the correct question paper has been provided but should not open the paper until the invigilator declares the start of the examination.

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

You may not leave the examination room except with the permission of the invigilator. Candidates are not permitted to leave during the first 30 minutes nor the last 30 minutes of an examination. You may take your question paper with you at the end of the examination but no other paper may be removed from the examination room.

An Examiner will be present for the first 30 minutes of each examination to whom queries about the paper can be addressed.

Your candidate number will be on the individual timetable sent to you by the Examination Schools. Please note that your candidate number is not the same as your student self service ID number which is printed on your university card. If you forget your candidate number you will be given the opportunity to ask one of the invigilators what it is. Please do not write down a number if you think it may be incorrect.

The use of calculators will not be permitted in these examinations.

- On papers A, B and D you should submit answers to no more than five questions. On paper C there will be two sections and you should submit answers to no more than five questions in all, with no more than three questions from section (i) and no more than three questions from section (ii).
- Begin each question in a new answer booklet.
- Hand in your answers in numerical order.
- Write the numbers of all the questions to be marked on the front cover sheet.
- If you answer fewer than five questions you must submit an empty answer booklet for each unanswered question, so that you still submit at least five booklets in total. (For example, if you answer three questions you should also submit two empty answer booklets with your candidate number on the front page.)
- Cross out all rough working and any working you do not want to be marked. If you have used separate answer booklets for rough work please

cross through the front of each such answer booklet and attach these answer booklets at the back of your work.

You are reminded also of the rule that you may not write in pencil, except to draw diagrams.

The use of dictionaries in Mathematics examinations is not permitted.

Make sure that every booklet has your number on it. At the end on the examination, you will be told to stop writing, and should do no more than complete the line you are writing. Please ensure that you have written the numbers of the five (or fewer) questions that you want marked on the front cover sheet, that you have crossed through any working that you do not want to be marked. You should then hand in scripts as directed by the invigilators.

If you wish to leave the examination hall at any time during the examination, to attend the lavatory or obtain a drink of water, raise your hand and wait for an invigilator to escort you out. Similarly, if you feel unwell, or wish to leave the examination early, wait for an invigilator to come. You will not be permitted to leave the examination hall because of illness and then return on more than one occasion during a single examination. You will not be allowed to leave during the last 30 minutes of a paper, except in the case of illness, to avoid disruption to other candidates or to the orderly collection of scripts. Candidates in Mathematics and Philosophy will be instructed on the number of questions to be attempted on Philosophy papers.

B Chairman of Examiners

'Regulations for the conduct of examinations, Part 6', in the *Examination Regulations* covers the appointment of the Chairman. The Committee for the Nomination of Examiners will usually appoint a Chairman in Trinity Term of the preceding year.

C Examiners

Moderators should ensure that they are equipped with the following documents which will be provided by the Maths Institute's administration, either in hard copy or in electronic copy.

- The *Examination Regulations*.
- The *Notes for the Guidance of Examiners and Chairmen of Examiners* (produced by the Proctors' Office and sent by that office to Examiners).

- The Educational Policy and Standards Committee *Notes of Guidance on Examinations and Assessment*.
- The *Aims and Objectives* of the mathematics courses, as agreed by the Teaching Committee.
- The *Course Handbook*, including the *Lecture Synopses*.
- The examination papers from the preceding two years.
- The Examiners' Reports on these examinations.
- Reports to the Teaching Committee on individual papers where appropriate.
- The published tables of *Class Percentage Figures* for both Mods and Finals for the last two years (as published in the Examiners' Reports) referring to guidelines from Education Committee.

D Form of Questions

Each question will be marked out of 20 and should be divided into two or three parts. An indication of the raw marks available for each part of each question should be given on the question paper. There should be sufficient elementary straightforward material to make the question inviting and aid in the assessment of weaker students.

E Target Marks

Examiners should follow any guidance in the *Course Handbook* on the profile of marks they are aiming for the candidates to achieve. Examination marks will be reported to candidates in the form of University Standardised Marks. Examiners may recalibrate raw marks but, in setting the papers, should aim to minimise the need for recalibration.

F Checklist for Setters and Checkers

The Examiners should provide those asked to supply draft questions with a checklist of important considerations.

1. Is the question on the syllabus (as in the *Exam Regulations* or *Course Handbook* (including the *Lecture Synopses*))?
2. Is the mathematics correct?

3. Is the notation and terminology standard/obvious/defined? Is it unambiguous?
4. Is it clear what may be assumed, what detail is required, and what would constitute a complete answer?
5. Is the question of a straightforward character? (This is no longer explicitly mentioned in the *Examination Regulations* but setters should avoid unnecessary complexity.)
6. Is the form of presentation familiar/inviting/readable?
7. Has an easy start been provided?
8. Could a second class student score at least 10-12 marks?
9. Are the questions as a whole fairly spread across the syllabus?
10. Are the questions as a whole of comparable standard to other questions this year?
11. Are the questions as a whole of a similar general nature to questions in previous years?
12. Are the questions formatted using `oxmathex.sty`?

Setters should aim to make at least 6 marks accessible to candidates with some basic knowledge of the topic examined in that question and to make a further 4-6 marks available for straightforward material. However, the hardest part of the question should be sufficiently demanding only to be accessible to those candidates who meet the criteria for a First. Setters are reminded that candidates on the borderline for Honours should typically obtain about 8 marks per question. The median mark per question should be around 13. As a guide, Examiners should note that a complete answer should take approximately 30 minutes to produce under examination conditions.

Examiners and Assessors are asked to note that **all comment lines should be removed** from examination questions submitted to prepare the camera ready copy. This is important as examination papers are supplied in various formats to candidates with special needs. We recommend that macros are not used.

G Protocols

For Moderations and Prelims, each paper (or part-paper) should be set by an Examiner (or Assessor) and checked by another, the whole paper being reviewed and approved by the whole examining board. Examiners and assessors are reminded of the need for security of examination papers. Examinations papers must be kept in a “By Hand Only” folder and must be passed via the Academic Administration Office in person and by hand only.

H Model Solutions

Those setting questions are asked to provide complete model solutions, annotated so as to indicate what is considered bookwork, what has been seen before on problem sheets and what is considered to be new and unseen, and with a draft Marking Scheme for the approval of the Examiners; the solution, with additional comments, should also make clear how much of the question is accessible to less strong candidates.

I Aims of Marking Schemes

Marking schemes for the questions should aim to ensure that the following qualitative criteria hold:

17–20 marks a completely or almost completely correct answer to the whole question.

13–16 marks standard material substantially correct plus substantial progress on the other parts of the question.

7–12 marks standard material substantially correct and some minor progress on the other parts of the question.

0–6 marks for elementary, accessible material.

This should be regarded as a guide conveying the intentions of the Moderators.

J Approval of Marking Schemes

The Marking Schemes are approved by the examiners alongside the papers. Minor edits may be made during the setting and checking process in consultation with the setter.

K Invigilation

The Examination Schools should inform a candidate's college if an incident occurs during the sitting of the papers which is recorded in the log sheet, so that, for example, a medical certificate can be sent to the Chairman of Examiners if appropriate.

L Marking

The Moderators should provide each Marker with the Marking Scheme approved by the Examining Board. Letters to Markers in previous years are commended; the following points must be made:

Marking Schemes Moderators have seen and approved the Marks Schemes.

It is the responsibility of the marker to use the approved marking scheme, discarding earlier drafts. Markers (usually Moderators) should apply the schemes consistently, however, it may become clear while marking that the allocation of marks should be changed. If such a change is made, then please make sure that you do so consistently, and that all Moderators are informed that this has been done.

Mark Ranges in Mods In all Mods papers, questions are to be marked out of 20 marks. Setters should aim to make at least 6 marks accessible to candidates with some basic knowledge of the topic examined in that question and to make a further 4-6 marks available for straightforward material. However, the hardest part of the question should be sufficiently demanding to be only accessible to those candidates who meet the criteria for a First. Setters are reminded that candidates on the borderline for honours should typically obtain about 8 marks per question. The median mark per question should be around 13.

Marking The Examiners will want to review at least some of the scripts during the classification process. They will not want to re-mark (since they cannot do so consistently across all candidates). They will want to be able to see quickly where marks have been gained. They will also want to be sure that all a candidate's work has been taken into consideration. Markers are therefore asked:

- to indicate both the marks given and the marks available for each part of a question, expressed as a fraction writing, e.g., $\frac{3}{5}$
- to show the total mark for the question in some distinctive way, e.g., 18;
- to leave some trace that each page has been marked; pages on which no individual marks have been shown should not be ticked, but marked “\”;
- to copy the total mark for each question on to the cover sheet;
- to use some colour of ink not used by the candidates;
- not to write comments on the scripts, but, if necessary on the mark sheets provided, (markers may indicate briefly to the Examiners where arguments are flawed).

Mark Sheets Pre-printed marks sheets will be supplied.

In entering into the pre-printed mark sheets the numerical mark for a question, care must be taken to distinguish between 0 marks for an attempt and – for a non-attempt.

Assessors are asked to compute the check-sum for each candidate, which is the candidate number(mod 100) plus the sum of raw marks.

Before sending in the marks sheets, markers should take a photocopy.

Reports The Examiners must give a brief report on the overall performance of the candidates on each paper (or part-paper) to assist them in their deliberation on recalibration; in particular markers/assessors are invited to suggest where class boundaries could be drawn.

M Checking the Marks

The Examiners should ensure that their procedures allow for:

- an independent arithmetic check of the correctness of the addition of the partial marks for each question;
- an independent check of the marks entered into the marks database for each candidate;
- an audit trail for these checks.

In recent years graduate research students have been employed to carry out such checks. The standard document ‘Instructions for Graduate Checkers’ is kept in the Academic Office, and gives details.

N Recalibration of Marks

On each paper, any recalibration of marks should be done without disturbing the order of candidates. In order to ensure fair treatment Examiners are reminded that they may exercise individual consideration in assigning USMs for candidates whose marks lie outside the standard pattern.

Examiners should take note of the distribution of USMs above 60 and above 70 in the Examination in a normal year and not depart from it without good reason. Information about the distribution of USMs in the Examination for recent matriculation years can be obtained from the Academic Administrator.

The object of the USM is to allow direct comparison between the results of examination in different subjects. This means that the USM will not necessarily be equal to the raw mark.

USMs on each paper should be symmetrically rounded.

O Classification of Candidates

The average USM ranges used in the classifications reflect the following general **Qualitative Class Descriptors** agreed by the Teaching Committee:

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.

Second Class: the candidate shows adequate to good skills in reasoning, deductive logic and problem-solving. He/she demonstrates a sound to poor 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 the basic material.

Fail: little evidence of competence in many of 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.

P Post Examination

Examiners should ensure that the following are deposited with the Academic Administrator (or deputy), Mathematical Institute:

- a definitive record of individual USMs, signed off by one of the Examiners (to be kept on file at the Institute for reference and for use in later examinations);
- all records of the Examination not otherwise destroyed and declarations relating to the destruction of examination material (as requested by the Proctors);
- full marking schemes, including any subsequent amendments;
- LaTeX source files for the papers incorporating any corrections (which will be passed to the computing officers for the electronic archive).

Chairman
on behalf of the Teaching Committee.