Oxford University Computing Laboratory
Teaching Committee

Examination Conventions for Moderations 2009

This document establishes the examining conventions to be used in the following public examinations:

Honour Moderations in Computer Science

Honour Moderations in Mathematics and Computer Science

Preliminary Examination in Computer Science

Preliminary Examination in Mathematics and Computer Science

It also establishes the conventions to be used in those parts of the following public examinations that fall under the responsibility of the Examiners or Moderators in Computer Science:

Final Honour School of Engineering and Computing Science

Final Honour School of Mathematics

Nothing contained in this document supersedes the University's regulations and policy set out in the current *Examination Regulations* and the *Notes for the Guidance of Examiners and Chairmen of Examiners* and the *Notes of Guidance on Examinations and Assessment.*

The Teaching Committee of the Computing Laboratory *directs* that examinations for which it is responsible are conducted in accordance with these conventions. The Board of Examiners may make minor deviations from these conventions in exceptional circumstances, ideally after reference to the Teaching Committee or the Proctors.

Documentation

Examiners should have access to the following documents. The Chairman of examiners should ensure that, where appropriate, external examiners have access to these documents.

1. The current *Examination Regulations* (grey book).
2. The booklet, *Notes for the Guidance of Examiners and Chairmen of Examiners*, published by the Proctors' Office.
3. The Educational Policy and Standards Committee *Notes of Guidance on Examinations and Assessment*.
4. The *Course Handbook*, including the syllabus for each lecture course.
5. The *examination papers* from the preceding two years.
6. The *Examiners' Reports* on these examinations.
7. The *External Examiners' reports* for the previous two years, together with the responses to these reports made by the Teaching Committee.

8. Any responses to these reports made by the Teaching Committee on behalf of the Faculty, and any additional decisions of the Teaching Committee
9. The published tables of *Class Percentage Figures* for the last two years (as published in the Examiners' Reports) and following guidelines from EPSC.

1 Setting the papers

In setting the papers, Examiners should be guided by the style of papers set in previous years, together with the Examiners' Reports and any Specimen Questions issued by the Faculty.

Questions on each subject within a paper will normally be set and marked by the member of staff who gave the lectures on that subject in the year immediately preceding the examination, who should be appointed as Assessor.

The number of questions on each paper is specified in the *Undergraduate Course Handbook* and in the *Syllabuses and Synopses* on the departmental website (which is formally part of the Handbook).

Examiners and Assessors should attempt to set papers that do not require too much rescaling. Any rescaling function with a steep gradient has the effect of magnifying imperfections in the marking scheme. Experience has shown that often the raw marks spread the candidates out too much: this suggests that the easy parts should be made easier, and the harder parts made harder.

Engineering and Computing Science students take some exams (Functional Programming, Data Structures and Algorithms, Procedural Programming, and Discrete Mathematics) a year after they have been taught. Examiners and Assessors should ensure that questions are appropriate to the way in which those students were taught.

Protocol

The following protocol should be followed for the setting of each paper:

1. Questions on each subject within the paper will be set by the Assessor.
2. The paper will be checked by an Examiner, or another suitably competent member of academic staff.
3. An Examiner will produce the final draft paper.
4. The paper will be reviewed and approved by the whole examining board.

A checklist that may be given to Assessors is attached as Annexe A.

Model solutions and marking scheme

Assessors must be 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. As a guide, approximately

60% of each question should be of a straightforward nature, maybe containing a small amount of bookwork.

The marking scheme for each question should aim to ensure that weaker candidates can gain marks by answering the initial parts of the question, and stronger candidates can show the depth of their understanding in answering the later parts. All questions are marked out of 20 in Mods, and in Finals papers in other schools that are shared with Computer Science Mods.

The marking schemes should be approved by the examining board alongside the papers. Examiners should check that questions are of a consistent difficulty within each paper and between papers, bearing in mind the following standard criteria, expressed in percentage points:

≥70	Class I	A very good answer that is structured, innovative and comprehensive
60-69	Class II(i)	A good answer that includes major points and their significance
50-59	Class II(ii)	A less than satisfactory answer that includes some major points
40-49	Class III	A weak answer that omits several major points
30-39	Pass	A very poor answer that fails to address considerable areas of the question
<30	Fail	A totally inadequate answer

Examiners should be rigorous in ensuring that the checklist of Annexe A is followed.

Rubric

The five papers for Computer Science Moderations are:

CS1 Functional Programming and Design & Analysis of Algorithms

CS2 Imperative Programming

CS3 Discrete Mathematics and Linear Algebra

CS4 Digital Hardware, and Logic and Proof

M1(CS) Applied Mathematics

Papers CS1, CS2, CS3 and CS4 will each be of 3 hours' duration and will contain eight questions (four on each constituent course); candidates may answer up to five questions, with no more than three questions from either half of the paper.

Paper M1(CS) will be of 2 hours' duration and will contain four questions (two on Calculus and two on Probability); candidates may answer up to three questions.

Maths & Computer Science candidates will also take five papers; CS1 and CS2 as described above, and also

M1 Pure Mathematics I

M2 Pure Mathematics II

M3 Applied Mathematics

Paper M1 will be 2.5 hours' duration and will contain seven questions (the same as the corresponding Maths paper but excluding Geometry I); candidates may answer up to four questions. Paper M2 will be 2.5 hours' duration and will contain seven questions (the same as the corresponding Mathematics paper but excluding Geometry II); candidates may answer up to four questions. Paper M3 will be of 2 hours' duration and will contain five questions (two on Calculus and three on Probability); candidates may answer up to three questions.

2 Marking and checking scripts

Marking

The marker for each subject will normally be the Assessor appointed to set that subject. Where questions do not have a precise marking scheme, for example, essay-style questions, the students' answers should be independently double marked. The Examiners should provide each marker with the approved marking scheme for the paper. Markers should be instructed to follow the approved marking scheme, and to carry out procedures for avoiding errors in transcription of the marks. A suitable checklist is attached as Annexe B.

The Chairman must ensure that those appointed as Assessors are informed of the Examiners' timetables, and are made aware that they must be available for consultation by the Examiners until the signing of the Class/Pass Lists, and in particular during the input and checking of the marks.

Processing of marks

The Computing Laboratory provides a database system for checking and processing marks. Examiners should use this system and reports from it to ensure that the following checks are carried out:

- 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 database for each candidate;
- a central log is kept of the whereabouts of all scripts.

3 Moderation and classification

The critical task for examiners will be to translate the raw marks on each paper into University Standardised Marks (USMs) out of 100.

EPSC guidance is that scaling should be carried out so that:

(i) The percentages of candidates in each class are not substantially out of line with those in other subjects across the divisions.

(ii) The outcome of the final division of classes is consistent with the examiners' evaluation of the performance of the candidates in relation to qualitative descriptors of each class.

Teaching Committee's view is that (i) is more important than (ii).

In producing USMs, Examiners are advised to follow advice given in the Examiners' Report from the previous year, along with their own judgment. It is appropriate to scale different papers in different ways so as to compensate for differences in difficulty. A quantitative description of the procedure, for each paper, for translating raw marks into USMs should be included in the Examiners' Report.

Examiners will try to ensure that the rescaling is fair to all students. They should inspect a suitable sample of scripts. They may perform an initial mechanical rescaling, but will then consider whether this obtains fair results. The suggested rescaling method is to use a piece-wise linear function, typically with four control points corresponding to (1) the top candidate, (2) a USM of 70, (3) a USM of 50, and (4) the bottom candidate.

Examiners will apply a series of sanity checks to the proposed USMs for each paper:

- Examine the proportion of students in each class with MPLS averages;
- Consider the mean and standard deviations for each paper: a mean in the mid to high 60s, and a standard deviation of about 10 is probably appropriate;
- Compare the marks for students on this paper with that student's average marks across all papers; this will help to identify papers with above or below average students.

The Examiners should pay careful attention to what candidates have been told in the *Examination Regulations* and the *Course Handbook*, and should have regard to the percentages of candidates in each class in previous years, both in the same examination and across the University.

Evidence of recent medical problems, etc., should be considered at this stage, and USMs adjusted if appropriate.

Practicals play no part in the classification, except that a candidate must pass the practical component of the course in order to pass the exam. A student who does not pass the practicals fails Mods, and so must sit Prelims, and will receive a marks penalty in Prelims. The suggested penalty is

(30 - mark) x number / 12,

where mark is the average practical mark obtained, and number is the number of courses with practicals taken by the student. This penalty should be applied to all Prelim papers, except no mark may be reduced below zero.

The class list must be compiled from the USMs without the exercise of further discretion on the part of Examiners.

The average USM should be calculated from the USMs for individual papers, weighted by the number of questions students may answer; for Computer Science students

Average-USM = (5 x USM for CS1 +
5 x USM for CS2 +

5 x USM for CS3 +

5 x USM for CS4 +

3 x USM for M1(CS)) / 23

for Mathematics and Computer Science students

Average-USM = (5 x USM for CS1 +

5 x USM for CS2 +

4 x USM for M1 +

4 x USM for M2 +

3 x USM for M3) / 21

The average USM is rounded up to the nearest integer.

Mathematics & Computer Science students must score at least 30 on every Mathematics paper in order to pass Mods.

A degree class is assigned according to the following table:

First class	Average at least 70 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 innovatively in unfamiliar contexts.
Upper second class	Average at least 60 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	Average at least 50 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	Average at least 40 the candidate shows reasonable understanding of at least part of the basic material and some skills in reasoning, deductive logic and problem-solving
Pass degree	Average at least 30 The candidate shows some limited grasp of basic material demonstrated by the equivalent of an average of one meaningful attempt at a question on each unit of study. A

	stronger performance on some papers may compensate for a weaker performance on others
Fail	Average less than 30 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.

Treatment of practicals

Practicals do not contribute to the classification of candidates, but each candidate must pass the practical course in order to pass the examination. It is therefore necessary for the examiners to determine which candidates have passed the practical course. In addition, a Distinction can be awarded for practical work. This is reported on the summary of marks that tutors receive, and in the due course of time will appear on University transcripts.

Reports on practicals are marked by the demonstrating staff just after the practical has been completed, and the examiners receive these marks, together with the practical reports themselves. The demonstrating staff are not appointed as Assessors for the purpose of marking practicals, and it is therefore up to the examiners to determine what credit is given for each piece of practical work. The marks given by the demonstrating staff may be used as a guide to identify those candidates whose practical work requires close scrutiny by the examiners.

The Examiners will give no credit for practical work that was not submitted for marking by the deadline and signed by a demonstrator, unless there are extenuating circumstances. Likewise, the demonstrators will not mark work that is late, unless there are extenuating circumstances. Work submitted late for a good reason, such as illness, may be submitted through the student's tutor.

The following numerical procedure is suggested for processing the marks. Each practical is marked on a scale S, S+, S- that is explained in the Course Handbook at

http://web.comlab.ox.ac.uk/oucl/courses/undergrad07-08/handbook/section5.html

These marks should first be converted to numbers using the following scale:

S+	100
S	60
S-	20

Next, take a mean of the practical marks for each course (i.e. half paper). Finally, take a weighted mean of the marks for each course. The weights given to papers may be

adjusted to take into account variations in the amount and difficulty of practical work. The borderlines of 30 for a Pass and 70 for a Distinction should be used.

Examiners will want to make their own assessment of the amount and quality of practical work submitted by a candidate before taking the drastic step of failing the candidate solely because of inadequate practical work.

Late submission or failure to submit coursework

Under the provisions permitted by the 2007 regulation, late submission of coursework (i.e. practical and project reports) will normally result in the following penalties:

Where permission for late submission has been granted by the Proctors (under clause (1) of para. 16.8, page 45), no penalty will be imposed.

Where permission for late submission has not been granted by the Proctors, but the Proctors have given leave for the candidate to remain in the exam (under clauses (3) and (4) of para. 16.8), the Examiners may impose a penalty not exceeding the credit available for that piece of work. The Examiners should take into account such factors as:

1. the evidence forwarded to them by the Proctors and (insofar as the following matters are not dealt with by such evidence);
2. the degree of advantage gained by the extra time made available to the candidate relative to the time that was available to complete coursework by the original deadline;
3. the weight to be attached to the reason given, if any, for late submission.

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.

4 Communication with candidates

The Chairman of Examiners should write to candidates, reminding them of the general form and procedure for the examination. Letters to candidates from recent years are commended as examples to follow.

5 After the examination

It will be helpful if Examiners will ensure that:

- Full Marking Schemes are deposited (after the examination is complete) in the Examiners' files, kept in the Departmental Office by Wendy Adams.
- LaTeX source files for the papers (incorporating any corrections) are kept for the electronic archive.

Annexe A: Checklist for setting papers.

1. Is the question on the syllabus, as defined by the Course Handbook?
2. Is the question technically correct?
3. Is the notation and terminology standard or obvious? If not, is it defined within the question? Is it unambiguous?
4. Is it clear what may be assumed, what detail is required, and what would constitute a complete answer?
5. For Mods, is the question of a straightforward character? For Finals, does it avoid unnecessary complexity?
6. Will the form of presentation be familiar to candidates?
7. Has an easy start been provided?
8. Could a second-class or third-class candidate gain marks by doing the easy part of the exam question, even if he or she could not finish it?
9. Can the question be done by stronger candidates in the appropriate time? (Finals questions are expected to be slightly longer than Mods questions.)
10. Has a reasonably detailed marking scheme been provided?
11. Does the question avoid using over-complicated language and making cultural assumptions?
12. Are the questions as a whole fairly spread across the syllabus?
13. Are the questions as a whole of comparable standard to other questions this year and in recent years (taking into account comments in the Examiners' reports)?
14. Are the questions as a whole of a similar general nature to questions in previous years (taking into account comments in the Examiners' reports)?

Annexe B: Checklist for marking

1. The Examiners have seen and approved the marking schemes, and markers must use these consistently. However, it may become clear while marking that the allocation of marks should be changed. In this case, the marker should ensure that the modified scheme is applied consistently to all candidates' scripts, and the examiners should be informed.
2. Each script is checked for the completeness of marking, and the Examiners review at least some of the scripts during the classification process. Markers are therefore asked to make it clear on each script how many marks have been awarded for each part of a question, and to circle the total mark for each question on the script. They are also asked to indicate with some mark that they have read each page of the script.
3. Markers may, if they wish, write remarks about the quality of the answers, and note for the examiners any defect in the argument. However, please note that any comments (i.e. single words or collections of words) on scripts are discloseable under the Data Protection Act. Markers may record part marks, ticks and crosses (for example to denote objective correctness or otherwise), and lines to indicate that portions of a script have been read, on the script itself. However, this must only be done in the left-hand margin of the script so that the record can be covered up if remarking is required. This non-verbal information is not discloseable. In subjects where single-marking is allowed, it is important that on every page of a script is drawn a line in the left-hand margin to indicate that the examiner has read it even if no marks are accumulated.
4. The marks awarded for each question should be shown on the cover sheet and entered on the pre-printed mark sheet supplied. Markers should distinguish on the mark sheet between an attempt that is awarded no marks ('0') and a question that is not attempted ('—'). A check-sum should be computed for each line according to the instructions provided.
5. The supplied mark sheets should tally exactly with the scripts from the examination, taking into account blank cover sheets from candidates who have attempted no questions. Misdirected scripts should be returned immediately, and extra scripts should be marked and drawn to the attention of the Examiners.
6. Markers should keep a copy of the completed mark sheet.
7. Markers should send to the Examiners a brief report on the performance of candidates on each question and on the subject overall. This report will be used in the classification process and in compiling the Examiners' report.

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