

Examination Procedures

Examiners are asked to provide their questions in the form of *camera-ready completed papers*, typed in the appropriate format with title/rubric page, good quality diagrams and a full set of [marking criteria](#). The goal is to carry out minimal revision of these papers after the initial submission, so setters/checkers should be confident that each paper is ready to present to candidates or to an [external examiner](#). (To this end, setters and checkers are asked to sign a cover sheet for each paper, confirming its readiness.)

One printed copy of each paper should be submitted to the Student Services Office. The call for questions includes: the dates, times and membership of the co-ordination meetings; a list of modules; and a list of setters and checkers - questions must be set and checked by the persons indicated, unless the [Examinations Officer](#) agrees to a substitute (it is understood that questions will eventually be marked by the setter). A template with preset styles is available (see below). Some guidelines for typing are given below.

Co-ordination meetings will consider the papers as submitted, without any revision by the Examinations Officer. Thus it is important that editorial matters and issues of the technical accuracy of the content are sorted out before submission - there should be no need to spend significant time on these at the meetings, where the main task will be to check the overall level of each paper, and that the distribution of marks within each question are in accordance with the guidelines below.

After the corrections required by the co-ordination meeting have been made, the papers are sent to the External Examiners who may require further amendments before granting their approval.

Examination Security

Under no circumstances must the contents of examinations be revealed to any person who is not a member of the Board of Examiners or an approved member of the University Staff.

Shared and/or networked computers present special security problems, in particular:

- Examinations must be prepared and stored only on computers which have physical and software security measures that are fit for purpose, *i.e.* it must be beyond reasonable doubt that exam papers have been kept secure at all stages of their preparation prior to use. The College's IT support staff will give advice on request, and staff should review their practice in order to keep up with changes in technology.
- A test page must be printed immediately before printing an examination to check that it isn't going to appear in the wrong place)
- Unencrypted files must not be sent by email, it is not secure.
- Memory sticks are small, portable and easily lost. Keep them under lock and key at all times and encrypt files where practical, *e.g.* by creating an encrypted disk image:
 - [Mac OS X: About Encrypted Disk Images](#)
- Examiners should be aware that, on typical computer systems, a 'deleted' file remains easily-

readable for a long time after its deletion.

Guidelines For Setting Exams

All modules need to be assessed in a manner such that the final module mark is consistent with the [University Generic Marking Criteria](#). When setting questions examiners should structure them so as to achieve the following mark distribution:

- Approximately 40% of the marks for the question should be for relatively straightforward material (*e.g.* basic concepts and definitions) and should be answerable by any student who has attained the essential learning outcomes (threshold level)
- Approximately 10% of the marks for the question should be for difficult material that only potential first-class students are expected to answer well.
- The remaining marks for the question (approximately 50%) should be for material at an intermediate level.

The implication of this scheme is that, within a question, no attempt should be made to assign equal marks for equal difficulty. We should, however, be guided by the principle of equal marks for equal time spent by a good candidate in answering the question. Where appropriate, examiners should attempt to include a reasonable number of calculations leading to a numerical answer within a paper.

Take special care when setting an exam for a module that comprises parts delivered by different lecturers to ensure that students can't selectively revise parts of the module and still achieve a good mark. Consider, for example, an exam paper where students must attempt two out of four questions for a module has been delivered by two different lecturers. Normally, each lecturer should set one whole-question and half of two shared questions.

Examinations have to be appraised by internal and external examiners who were not involved in delivering the module. To ensure that they have the information necessary, mark schemes must indicate the level of difficulty of material by identifying it as requiring 'Recall', 'Application' or 'Synthesis'. These categories are roughly equivalent to the traditional 'bookwork/seen/unseen' nomenclature, but are more generally applicable. This table gives an indicative guide to the use of these categories:

Type of Question	Category of question/part		
	Recall	Application	Synthesis
Mathematical	Quote mathematical formulae or proofs	Solve problem of previously seen type or requiring a straightforward procedure.	Construct solution to an unseen problem, <i>e.g.</i> by selecting and combining single-step methods. Exercise foresight and judgement in choice of method.
Scientific	State laws and facts, quote	Use factual knowledge and	Construct solution to an unseen or

	formulae, describe experiments. Recall factual content of lectures and/or directed reading.	reasoning to answer questions. Solve familiar types of problem.	complicated, problem.
Technical	Describe standard procedures	Analyse results using standard methods	Design experiments or measurement schemes.
Qualitative	Describe phenomena, methods, history, <i>etc.</i>	Use familiar methods and/or ideas to analyse and/or evaluate observations.	Demonstrate independently critical engagement with primary and/or secondary literature.

Note: Whilst it can be appropriate to recycle parts of old questions, questions from recent years should not be reused as they stand, in their entirety. Where old questions are reused in a substantially unchanged form, their source must be indicated on the mark scheme so that checkers and external examiners can verify the integrity of the examination.

Rubrics

The structure of examination papers is expected to follow a standard pattern as specified below. Variation of these structures is allowed for exceptional reasons, on the authorisation of the Director of Education. In cases where the rubric instructs the candidate to attempt more questions than are required to achieve full marks, this should be clearly stated: *e.g.* "Attempt all questions. X complete answers are required to achieve full marks (Y)".

Physics Examinations

Mathematics Levels 4 & 5 (PHY1025-26, PHY2025 15-credits)	Time allowed 2 hours. Five questions, each worth 20 marks, with the rubric: 'Answer FIVE questions. Full marks (100) are attained with five complete answers (subject to moderation at the Examination Board).'
Mathematics Level 6 (PHY3062 15-credits)	Time allowed 2 hours 30 minutes. Five questions, each worth 20 marks, with the rubric: 'Answer FIVE questions. Full marks (100) are attained with five complete answers (subject to moderation at the Examination Board).'
General Problems Level 6	Time allowed 2 hours 30 minutes. Section A: twelve questions, each worth 6 marks; Section B: four questions each worth 14 marks; with the rubric: 'Answer TWELVE questions from Section A and TWO

(PHY3053 15-credits)	questions from Section B. Full marks (100) are attained with twelve complete answers from Section A and two complete answers from Section B (subject to moderation at the Examination Board).'
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Physics Examinations Taken in Jan/Feb 2014 and Earlier

Physics Levels 4 & 5 (15- credits)	Time allowed 2 hours. Six questions, each worth 25 marks, with the rubric: 'Answer FOUR questions. Full marks (100) are attained with four complete answers (subject to moderation at the Examination Board).'
Physics Levels 6 & 7 (15- credits)	Time allowed 2 hours 30 minutes. Five questions, each worth 34 marks, with the rubric: 'Answer THREE questions. Maximum marks (100) are attained with three complete answers (subject to moderation at the Examination Board).'

Physics Examinations for Modules Taken in May/Jun 2014 and Thereafter

Physics Levels 4 & 5 (15- credits)	Time allowed 2 hours. Four questions, each worth 25 marks, with the rubric: 'Answer ALL four questions. Full marks (100) are attained with four complete answers (subject to moderation at the Examination Board).'
Physics Levels 6 & 7 (15- credits)	Time allowed 2 hours 30 minutes. Four questions, each worth 34 marks, with the rubric: 'Answer question 1 and TWO other questions. Maximum marks (100) are attained with three complete answers (subject to moderation at the Examination Board).'

Physics Mid-Term Tests

Physics and Mathematics modules at levels 4 & 5 (15- credits)	Time allowed: 30 minutes. Total of 25 marks, with the rubric: 'Answer ALL questions. Full marks (25) require complete answers to all questions.'
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Marking Criteria

A detailed set of Marking Criteria must be submitted with each paper. These will normally include:

- model solutions to problems, annotated with how many marks are to be awarded for each stage and the 'cognitive category' as [specified above](#);
- mark schemes for essays indicating how marks are to be awarded.

A satisfactory set of marking criteria would allow:

- someone other than the setter to mark the students' answers fairly,
- lecturers in future years to see what was required as an answer to that question, and

- the external examiners to confirm the cognitive level required by the assessment.

The marking criteria need to match the mark allocations on the exam paper, and this should be confirmed at the setting-checking stage.

Marking criteria and/or model solutions for past examinations are not made available students. This is policy was adopted by the Board of Examiners in order to encourage students to develop their own problem-solving skills and to discourage weak students from rote-learning past answers as a substitute for more appropriate learning strategies.

Solutions and Hints for Physics Examinations

A summary sheet of solutions and hints must be submitted with each paper. These will normally include:

- The final answer to the problems set in the examination;
- Brief hints or comments, where required, to indicate how the answer was arrived at.

After the examination, these [sheets are published on the WWW](#), their purpose is to enable a student who has made a serious attempt to engage with the problem to assess whether their method has yielded a correct solution. The typical amount of detail required is indicated by [this example \[pdf\]](#). Solutions are only required for the principal examination each year, not referred examinations.

Style of Referred Examinations

The style of a referred examination is normally identical to that of the original examination. Particular attention should be paid to the correspondence between the 40% pass mark and the stated learning outcomes for the module.

For a module in which the original assessment includes a component from coursework and/or mid-semester tests, the style of the referred examination may vary from that of the original examination. This allows for the fact that, in all cases, the referred assessment is based solely on the referred examination, *i.e.* previously acquired marks are discounted (see the applicable [Examination Conventions](#)).

Guidelines For Typing Exams

Start by obtaining the latest version of the templates to suit your computer from the following list. Depending on how your browser is set up, you may need to right-click (or click-and-hold) the link and ask for the file to be saved to disk 'as source'.

- University Examination templates:
 - PDF (to see how they should look): [exam-std.pdf](#)
 - RTF: [exam-std.rtf](#)
 - LaTeX (thanks to MJM):
 - [exam_macros.tex](#)
 - [exam_example.tex](#)

- [exam_example.pdf](#) (print at 100% scale)
- Marking Scheme templates:
 - RTF: [exam-mark.rtf](#)
- Solutions and Hints templates for Physics Examinations:
 - RTF: [exam-solns.rtf](#)
- Midterm in-class test templates for PHY Modules:
 - RTF: [exam-mtt-phy.rtf](#) (physics)
- Special Requirements and Tracking forms:
 - PDF: [exam-requirements.pdf](#)
 - RTF: [exam-requirements.rtf](#)
 - PDF: [Exam_Checksheet.pdf](#)
 - DOCX: [Exam_Checksheet.docx](#)

If you use Microsoft Word, you will need to turn off the 'Automatic' options which interfere with styles, paragraph numbering and formatting. In the event of problems, consult the [Examinations Officer](#).

(It may be helpful to print the template before altering it to see how it's meant to look.)

Indicate on page one if any materials are required in addition to the [sheet of Physical Constants](#) (for example, graph paper on request). In the case of an open-note exam, a prominent statement to this effect is required on page one. Start the questions on page two - page one is only for title, rubric, *etc.*. Type "Turn Over", at the foot of the page, where appropriate, and type "End of Paper" on the final page.

Use (i), (ii), (iii), *etc.* to label principal sections of the question, but only if these relate to different topics; (principal sections do not need labelling if they all relate to the same overall topic - just use separate paragraphs). Use (a), (b), (c), *etc.* to label such things as a sequence of quantities to be calculated or a list of terms to be defined.

The template has three styles, to be used as follows:

- EXAM1 is for the main sections of the question;
- EXAM2 is for sequences or lists labelled (a), (b), (c), *etc.*;
- DISPLAY EQUATION is for displayed equations.

For complicated equations it may be necessary to use the equation editor, but many equations can be typed as regular text, using formatting to produce subscripts, superscripts, *etc.*. The use of symbols and notation should conform to:

- ISO 80000-2 *Quantities and units – Part 2: Mathematical signs and symbols to be used in the natural sciences and technology*.

This can be achieved by following the NIST guidelines:

- [Guide for the Use of the International System of Units \(SI\)](#)

Briefly, almost all symbols (whether Latin or Greek) should be typed in *italics*. The three main exceptions are mathematical functions (cos, ln, *etc.*), subscripts that relate to names or words (k_B ,

E_{ext} , etc.), and physical units (mA, kg, etc.). Vectors should normally be typed in ***bold-italic*** (without arrow or underline). Subscripts and superscripts should be 9-point size. Type 0 (*i.e.* zero), not o (*i.e.* the letter oh), for superscript or subscript 'nought'. Put a space between quantity and unit, and between elements of a unit (*e.g.* 59 m s⁻¹, *not* 59ms⁻¹). Do not use a hyphen ('-') as a minus sign, the correct symbol '-' (an en-rule) is longer.

The NIST Guide has a detailed checklist in its preface.

Guidelines For Checking Examination Papers

It is the responsibility of the checker - after discussions with, and revisions by, the setter - to confirm that in their opinion the examination:

- is a fair, balanced and appropriate assessment of the module specified by the published [module descriptor](#);
- contains only material that is technically correct (within the limitations imposed by the level of the examination);
- is grammatically correct and worded in a way that will be unambiguous to the candidates;
- conforms to the above Guidelines For Typing Exams, and is free from typographical errors;
- contains the correct number of questions, with the correct number of marks, and is described by an accurate rubrik
- is supplied with a complete set of marking criteria as described above.

In the unusual event of an unreconcilable disagreement between setter and marker the advice of a suitably-qualified mutually-agreed third person must be sought.

Secure Transfer of Examinations

Every person responsible for an examination will be issued with a USB memory-stick by the Examinations Administrator. This device has been pre-loaded with:

- A folder for the current academic year, *e.g.* '2008_2009'
- A folder 'Exams_For_Other_Years' which holds an archive of folders from previous academic years.
- An HTML document linking to these instructions.

It is the responsibility of the examination paper author to provide in Adobe PDF format:

- The final examination paper ready to be printed and issued to students. The file name must be based on the module code with '.pdf' appended to the module code, *e.g.*
 - PHY3128.pdf – exam for PHY3128;
 - PHY3128R.pdf – referred exam for PHY3128;
 - PHY1116+PHY1126.pdf – same exam shared by two module codes;
- The [Solutions and Hints sheet](#), which will be published only after the the examination has been set. The file name must be '_HINTS.pdf' appended to the module code, *e.g.* 'PHY3128_HINTS.pdf'.
- If the mark scheme for the examination is available in electronic form, this should also be provided. The file name must be '_MARKS.pdf' appended to the module code, *e.g.* 'PHY3128_MARKS.pdf'.

These files must be put into the folder for the current academic year.

For obvious reasons, the memory stick must be kept physically secure at all times and handed to the Examinations Administrator (or their deputy) in person, not *via* internal mail or a pigeonhole.

Marking and Checking Examination Scripts

See also the Department [Assessment Marking Strategy](#).

1. Within a question, marks must be allocated according to the mark distribution indicated on the question paper and the approved marking criteria.
2. The marker should use a pen (not a pencil) which writes in **red ink**. The checker should use a pen which writes in **green ink**.
3. Unless annotation within the text of an answer is unavoidable, the marker should write only within the margins of the answer sheet.
4. Marks for individual parts of the question should be written in the outer margin. The total mark for the question, ringed for ease of identification, should be written in the outer margin at the end of the answer. The total mark should be copied into the mark table on the front of the answer book and into the module mark sheet.
5. Half-marks may be allocated to component parts of questions.
 - For Physics modules (PHYxxxx), the total mark for each question, must be rounded to an integer.

In all cases, the final mark for the examination script must be returned as an integer percentage. To facilitate checking, marks must not be indicated by '+/-' symbols, or any other cryptic notation.

6. The marker must inspect all rough work (generally at the back of the answer book) for material which deserves credit. If the mark table on the front page includes marks derived from rough work, this should be indicated this by a note next to the mark table.
7. Each page that has been considered by the marker (including all rough work) must have some indication to this effect. If a page attracts no mark or comment, the marker should put a line down the outer margin to indicate that the page has been seen.
8. For the benefit of external examiners and checkers, in cases where the rationale for allocation of an individual mark may not be self-evident, the marker should provide an explanatory note in the outer margin.
9. All answers submitted by a candidate must be marked. If the candidate has answered more questions than indicated by the examination rubric, the marks from one or more questions must be disregarded in order to obtain the appropriate number of question marks. (The lowest-mark question or questions should be disregarded, unless this results in a conflict with the rubric.)
10. Marks must be converted to integer percentages. There is a convenient [conversion table](#) for the common case where an exam is marked out of 60.
11. For each examination script, the checker must ensure that all pages have been marked, that all additions are correct, that the candidate's marks have been appropriately allocated in the light of the examination rubric, and that all totals have been correctly transferred to the cover of the examination book and to the module mark sheet.
12. Each page that has been considered by the checker (including all rough work and the front cover) must have some clear indication (in **green ink**) to this effect, preferably a tick in the top corner.

