

Exam style file – user manual

September 2021

1 Introduction

This manual explains how to typeset an exam paper using the Mathematical Sciences style file. Reasonable competence with L^AT_EX is assumed. (If this assumption is not valid in your case, **seek help as soon as possible** from the UG SEB chair.) Sample exam papers `sample_exam_***.tex` are also provided, and you should look at these in conjunction with this manual.

Please consult the UG SEB chair in case of any queries or difficulties.

2 Why we have a style file

The college is quite strict on the appearance of exam papers, in particular the wording used on the front page and in headers and footers. Using the style file means that this is all done for you, and you can concentrate on typesetting the actual questions in the exam paper.

There are also handy features, such as a tool to count the total number of marks available.

3 What’s new in 2021–22

The style file has been modified to reflect our return to timed online exams this year.

3.1 Online exams.

Due to exams being online, the style file now has key differences from previous years:

- The instructions on the first page reflect our online exam policies.
- The exam paper can no longer be used as an answer booklet. (To be more specific, the commands `\writeon`, `\writehere`, and `\mywritehere` have been disabled.)
- Calculators must be allowed for all exams. (To be more specific, the commands `\yescalc`, `\nocalc`, and `\statcalc` have been disabled.)

3.2 Basic mode.

The style file now allows for a “basic mode”, which can be used to typeset questions in the same format, but without the fancy exam title page. This could be helpful for setting individual questions for hybrid exams, or for setting midterm tests.

To use this, just invoke the environment `\begin{bscbasic} \end{bscbasic}` in the place of the usual `\begin{bscexam} \end{bscexam}`. (In fact, `bscbasic` does nothing except to slap the QMUL logo onto the top of the first page.) In addition:

- You can use the commands `\showexamtype`, `\showmoduletitle`, `\showexaminers` to display the usual exam period and module information.
- You can use `\nextquestionnumber{N}` to force the next question to have number N .

See the sample file `sample_exam_basic.tex` for more details on usage.

3.3 IFoA updates.

The list of modules associated with IFoA exemptions has been updated for the 2021–22 academic year. As usual, an exam for one of these modules will also automatically display IFoA-specific instructions on the front page.

4 What you will need

You will need the style file `qmulxm22.sty` and the image file for the college logo `QMlogo.pdf`. Put these somewhere that \LaTeX can find them (the simplest option is to put them in the same directory that your `.tex` file is in).

5 The start of the file

The style file is intended for use with the `book` document class, so you should start your `.tex` file with

```
\documentclass[12pt,a4paper]{book}
```

It's important to use the `a4paper` option (as the exam will be printed on A4 paper!) and to use either `11pt` or `12pt`. If you use `12pt` and you use lots of the additional features described below, then you may find that the front page of the exam paper is very crowded with text, so consider changing to `11pt`.

You then call whichever \LaTeX packages you need (such as `amsmath`, `amssymb` etc) and the all-important style file:

```
\usepackage{qmulxm22}
```

The `amsthm` package conflicts with `qmulxm22`, so you should avoid using it. I'm not aware of any other conflicts between this style file and other packages, but in case of problems it's safest to call `qmulxm22` after other packages. Let me know of any irreconcilable difficulties.

6 The preamble

In addition to whatever else you do in the preamble (defining commands etc), you need the following commands (appropriately modified) to set up the data pertaining to the exam.

```
\coursetitle{Topics in Mathematics}
\coursecode{MTH7920}
\coursecode{MTH7920P}
\examyyear{2020}
\examtime{2 hours}
\setter{L. Euler, B. Pascal}
```

Most of our modules have more than one module code, and these codes all need to appear on the front of the paper. Use a `\coursecode` command for each code, as above. If your exam is for two modules with different titles (such as Linear Algebra I and Applied Linear Algebra), then you should produce a separate version of the paper for each title, rather than trying to cram all the titles in one version.

If you omit the command `\examtime`, the style file will guess the exam duration based on your module code.

First and second examiners should be named in the `\setter{}` command.

You also need to specify which exam period this paper is for, by using one of the commands

```
\january    \may    \latesummer
```

(If you use more than one of these commands, the last one you use will override the others.)

If the paper is a special paper for resit/first-sit¹ students only in the January or May exam period, then you also need the command

```
\resittrue
```

Now there are some additional optional commands:

- use `\qmarksfalse` if you *don't* want the total number of marks for each question to appear at the start of the question;
- use `\showmarks` if you want to see a running total of marks available while you're writing the paper (but remove this command before passing the paper on to your checker);
- use `\writeon` if you want the question paper to serve as the answer booklet. (This is entirely up to you – some colleagues have trialled this successfully, but it's tricky to judge how much space to leave for the candidates to write in. Note that if you use this option, you need to add a request on the blue exam paper approval form for the booklets to be drilled in the corner so that supplementary booklets can be attached.)

Once the preamble is finished, you should

```
\begin{document}
```

as usual.

7 Typesetting the front page

Immediately after `\begin{document}` you need

```
\begin{bscexam}  
\begin{rubric}
```

(n.b. the environment is always `bscexam`, even for an M.Sc. paper; there's no `mscexam` environment.)

Now you need to put a rubric command. You have three choices.

- `rubricbest{m}` produces the following (you should replace `verb!m!` with the number of questions you want the candidates to answer, written as a word rather than a figure).

You may attempt as many questions as you wish and all questions carry equal marks. Except for the award of a bare pass, only the best `m` questions answered will be counted.

(The old versions of this command `\rubricone{m}` and `\rubriconebest{m}` still work.)

- `\rubricall` produces the following.

You should attempt ALL questions. Marks available are shown next to the questions.

(The old version `\rubrictwo` still works.)

¹Note that the word “resit” is used here, even if all the candidates are first-sits – “first-sit” never appears on the front of an exam paper.

- `\rubricsections{m}` produces the following (you should replace `m` with the number of questions you want the candidates to answer in Section B).

This paper has two sections.
 You should attempt all the questions in Section A. In Section B you may attempt as many questions as you wish. Except for the award of a bare pass, only the best `m` questions answered in Section B will be counted.

If you use this rubric, then you should then begin sections A and B with `\section*{Section ~\verb A}` and `\section*{Section ~\verb B}`, with Section B starting on a new page.

If your module is in some way special so that none of the above rubrics is suitable, then (if you have the express permission of the exam board chair) you can write your own rubric instead, with the command `\myrubric{}`; the rubric wording should go inside the `{}`. For example, you could say

```
\myrubric{This paper has 15 multiple-choice questions.
12 correct answers are needed to pass.}
```

Next you need a command to say whether calculators are allowed. If calculators are not allowed, use `\nocalc`. If calculators are allowed, then use `\yescalc`; you can follow this with `\statcalc` if appropriate. If the statements produced by these commands are not suitable for your exam, please consult the relevant SEB chair.

You should also use `\tables` if the Cambridge statistical tables are to be provided.

Now you finish off the front page with

```
\end{rubric}
\newpage
```

8 The body of the paper

At the start of the next page, you have the option of giving general instructions to candidates, e.g. on what they're allowed to assume, or setting out notation. You should do this with the command `\instructions`, which will put these instructions in a nice box.

```
\instructions{In this exam paper,  $\mathbb{R}$  denotes the set of real
numbers.}
```

```
In any question, you may freely use the Riemann Hypothesis.
```

```
Answers should always be simplified as much as possible.}
```

After this you should have `\section*{Section A}` if you're using the "two sections" rubric, and then you're finally ready to write some questions!

Each question should use the `question` environment. Make sure that a question doesn't split between pages (insert a `\pagebreak` before the question to avoid this) unless the question is so big that it won't fit on one page (in which case consider carefully where the best place is to split it).

Within each `question` environment, use an `enumerate` environment to set the parts of the question (which will automatically be labelled (a), (b), ...). For each part you should state the number of available marks using the command `\marks{}` at the end of that part. The total number of marks available for the question will automatically appear (though you will have to compile your document more than once for it to appear correctly).

Note that if the question-part ends with a displayed equation, then it's better to put the `\marks` command inside the displayed equation so that it lines up correctly. For example:

```

\begin{question}
Let  $G$  be a finite group.
\begin{enumerate}
\item Define what is meant by a subgroup of  $G$ . \marks{2}
\item Prove that if  $H$  is a subgroup of  $G$ , then
 $|G| = |G:H||H|$ . \marks{6}
\end{enumerate}
\end{question}

```

will produce the following.

Question 1. [8 marks] Let G be a finite group.

- (a) Define what is meant by a **subgroup** of G . [2]
- (b) Prove that if H is a subgroup of G , then

$$|G| = |G : H||H|. \quad [6]$$

If you're using the question paper as an answer booklet (i.e. you've issued the `\writeon` command), then you'll need to allow space for the candidates to write their answers. You do this with `\writehere`, which can be used anywhere, and will make a box occupying the remainder of the current page for the candidates to write in, like this.

Write your solutions here

If you want them to have the following page as well (or even more), just repeat the command `\writehere`. (`\writehere` will be ignored if you're not using the `\writeon` command.) If you want the box to contain instructions other than "Write your solutions here", you can use the command `\mywritehere{}`, with whatever wording you want inside the `{}`.

If you want to issue instructions to candidates part-way through a question, then you should use the command `\interject{}`, with the instructions inside the `{}`. (This suspends the `enumerate` environment, writes the instructions with appropriate spacing and indentation and then resumes the `enumerate` environment with the correct numbering.)

```
\begin{question}
\begin{enumerate}
\item Define what is meant by a \emph{relation} on a set  $X$ .\marks{2}
\interject{Now let  $X=\{1,2,3\}$  and let  $R$  be the empty relation.}
\item Is  $R$  reflexive?\marks{2}
\item Is  $R$  symmetric?\marks{2}
\end{enumerate}
\end{question}
```

Question 2. [6 marks]

- (a) Define what is meant by a **relation** on a set X . [2]

Now let $X = \{1, 2, 3\}$ and let R be the empty relation.

- (b) Is R reflexive? [2]
(c) Is R symmetric? [2]

A couple of points on formatting: the exam-setting notes from Registry stipulate that text must not be right-justified, and that neither italics nor underlining should be used for emphasis, as these can make text more difficult to read for some students. The style file automatically invokes `\raggedright` and redefines the command `\emph` to give bold rather than italics, but if you use `\textit` or `\it` for emphasising, then please modify accordingly.

9 Finishing off

Once you've written all the questions, you need to

```
\end{bscexam}
```

Now the only thing that's left is the appendix, if you have one.

```
\begin{appdx}
This appendix contains material for Question 4.
. . .
\end{appdx}
```

Now you can

```
\end{document}
```