Advice on studying

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If you are reading this, you are probably a first-year student at Queen Mary, studying for a degree in or involving Mathematics. (I realise that there are some exceptions to this statement.) This little note may be of some help to you in studying MTH4103: Geometry I, and possibly other modules too, as these notes are very general in nature.

Hopefully, you'll soon realise that university is not just like school, and we certainly don't spoonfeed you in the same way. One aspect of the difference between school and university is that the the lecture material will be presented at several times the speed you are used to at school. You are also expected to work on your own much more in independent working, in order to consolidate (through practice) the material we present to you. You should typically spend about 10 hours a week on each course. Of these, 3 hours are lectures, 1 hour is class, and 6 hours are for working on your own, reading through the notes, making sure you understand everything, and doing all the exercises, whether they need to be handed in or not. The homework you need to hand in should take you a small fraction of those 6 hours. Another difference between school and university is that your teachers are also your examiners.

Most importantly, you are here in order to learn and understand some Mathematics, not to get the best possible grades with the least possible effort. While it is my job to teach you Mathematics, this requires active participation on your part: learning is not a passive activity. You have no right to pass any course, or to get a 2(i) degree, or the like. You will only get these rewards if you make an appropriate amount of effort.

1 Lectures

Which of the following statements is correct? You understand new material best if:

(a) You listen to it in a lecture, or;

(b) You read it in a book.

Actually, they are both wrong. You have to work on new material in order to understand it. Both lectures and books (or lecture notes) have their place, and some people prefer one, some the other. But:

(a) In lectures, I urge you to take careful notes, and to concentrate during the lecture so that you understand as well as possible what you are writing down. Don't be afraid to stop me and ask for help if you don't understand. My job is to get you to understand, and I will try to do that. After the lecture, you should spend some time reviewing your notes and checking that you really did grasp it; if not, ask questions in the classes, or come to an office hour, to sort out your difficulties.

(b) Books have the advantage that you can take them at your own pace, but the disadvantage that you can't interrupt a book to ask questions. There will probably be exercises in the book; you should tackle some of these to check your understanding. Remember that being a student is a full-time job. This means we expect you to spend ten hours a week on each module, of which only four are timetabled hours.

2 Coursework

You will read in the handbook that coursework questions are designed to be like exam questions. What the handbook doesn't tell you is the very big difference between these things. Coursework is designed to help you to understand the material; exam questions, to test whether you do understand it. For example, some coursework questions will include drill in the use of a particular technique; an exam question might have a single example.

There is another difference between coursework and exams which I will come to later.

Some of the coursework questions will not be marked. This does not mean that we don't expect you to do these questions, or that it is enough to look at a question and think "I know how to do that" and turn to the next one. Write down your solution, and compare it later to the model solution. It may not be the same, but if yours is much shorter than the model solution it may mean that you have missed something important. (It may be that you have discovered a better solution than mine. This is not uncommon! But you should check carefully before coming to this conclusion.)

The answer to a question should not be just a string of symbols. You have to convince the marker that you have a correct solution to the problem. You have to do this convincing by means of an argument which is clear, grammatical and logical, as well as mathematically correct.

3 Classes

The purpose of classes is not for the tutors to tell you how to do the questions. We expect you to have thought about the question(s). If there is a word in the question that you don't understand, we expect you to have looked it up before asking for help. If you haven't, the tutor will probably tell you "Look it up in your notes, and call me again when you have done so".

More importantly, the classes are an opportunity for you to raise questions about things you have not understood or are not sure about. The tutors will be very happy to answer these questions.

4 Examinations

The other difference between coursework and exam questions is that you have a week to do your coursework, whereas you have to do all the exam questions in just two hours. So the exam questions will be much easier than coursework questions! Despite what you may be told, memorising solutions to coursework is unlikely to help you in an exam; but if you have understood how to do the coursework, the exam will be no trouble at all. (This said, please make sure that you know the definitions and the statements of the main theorems of the course. You will be asked some of these—see Point (c) below—and you are simply throwing away marks if you don't know the answer.)

There are many tips about taking exams. I will restrict myself to just a few here.

(a) Don't stay up late the night before cramming stuff into short-term memory! An exam is partly an endurance test (you have to be able to concentrate for two hours without a break), and you should be fit and rested before you go into the exam room.

(b) Give the examiners value for money. If you are spending too long on one question, leave it and try another. (But see Point (e) also.) If a question is worth five marks and you have only written a couple of words, stop and think: maybe the examiner wanted a bit more detail here.

(c) An exam question can contain three kinds of material:

- Bookwork (definitions or statements of theorems).
- Routine material which you will have seen before in the course.
- Questions designed to make you think, probably unseen.

Often all three will occur in the same question. Mathematics is about thinking and reasoning; so it is natural that we should expect you to do this in an exam rather than simply reproduce facts (though we expect this as well).

(d) In many questions, the solution to one part depends on the parts before it. So if you are stuck on part (b) of a question, leave it and go on to part (c), being prepared to assume what you were asked to show in (b).

(e) If you are running out of time, or if the details of something escape you, write down an outline of how you would answer the question if you had the time. You could get a significant proportion of the marks for doing this.

(f) Read each question carefully. Make sure you understand what the question is asking, and follow the instructions precisely. In particular, if a question asks you to solve a problem using a particular method, you will accrue no marks by using a different method, even if this other method is quicker. (For example, I shall often ask you to solve a system of linear equations using Gaußian elimination. Do not use another method instead.)

(g) If a question asks for a definition, give the definition as precisely and concisely as you can. Don't give an example, and don't say "It's like when . . . ". (In lectures I will often illustrate a definition by means of one or more examples. However, the example(s) are no substitute for the definition itself.)

5 And finally . . .

There was a question near the start of this document. Did you think about your own answer to it before you read on?

You can develop good reading habits which will help your study. When you meet a question, give your own answer before you see what the author has to say. When you meet an assertion, decide whether it follows from what has gone before. If not, spend some time on it; and if all else fails, ask a tutor in a class.

You may even find that these good habits spread out into your other reading, and you are less willing to swallow what politicians and journalists tell you.

6 Acknowledgements

What I have written here will be echoed by most other academic staff. Indeed, this document is a modification of one produced by Professor Peter J. Cameron.