TEACHING PHILOSOPHY

ADAM MARTENS

I tend to dislike typical teaching philosophies for a variety of reasons. As a student, I found them generally not useful (after all, I usually had to take a class regardless of instructors' philosophies). Now as a graduate student, when I think of a teaching philosophy, I usually think of a document that universities require their postdocs to have in order to be admitted: as if somehow a well-written essay about how one views about teaching is useful to anyone except the administrators and their need to check off a box on an application.

That’s not to say that I believe that every teaching philosophy that has ever been written is useless. To the contrary, I think that writing down ones own philosophy and pedagogies can greatly help shape ones teaching ability. I too follow certain teaching pedagogies which influence the way that I run a classroom, but I certainly don’t expect my students to particularly care about these. On the other hand, I expect my students to care about how their class is going to function on a day-to-day basis. I expect that they will want to know how difficult their exams will be. I expect that they will want to know if and how their grades will be scaled. And so on. It is for this reason that I have chosen to write down my philosophies about teaching through the use of a FAQ. These are questions that I have either asked or had asked of me throughout my academic career. If you have questions that you think should be added, I would be happy to oblige. I believe it is the answers to these practical questions that may actually help students succeed. And at the end of the day, that is what teaching is all about.

Disclaimers: (1) I am answering these questions with a first year calculus class in mind, and many of the answers may change slightly depending on the class; (2) This document is only meant for you to get an overall feel for how a class of mine will be run and should not be used as a syllabus.

Question 1: How do I interpret my grade?
Question 2: I failed this class. Where do I go from here?
Question 3: Why do so many students fail math classes?
Question 4: Are you trying to fail a certain percentage of us?
Question 5: Are the grades ever scaled in this class?
Question 6: How is scaling done?
Question 7: Do you ever scale grades down?
Question 8: How many questions are on the exam?
Question 9: How hard will the problems on the Midterm/Final be?
Question 10: Why was our exam so much harder than the practice (or previous years) exam?
Question 11: How should I prepare for the exam?
Question 12: How do you grade exams?
Question 13: I know/suspect one of my classmates cheated on an assessment. What should I do?
Question 14: Should I buy a calculator for this course?
Question 15: Why aren’t calculators allowed on exams? I like having the security and being able to check my computations.

Q 1. How do I interpret my grade?

A: Here I will give you a quick breakdown of what most of the letter grades mean. I leave it up to you to interpolate what the intermediate grades (like ‘A-’ or ‘B+’).
If you receive an ‘A+’: You have mastered ALL of the learning goals of the course and you have an excellent grasp on the ‘larger picture’. You confidently tackle new problems presented to you. You do not often make algebraic or computational errors. You correctly use the notation that was taught in class and your solutions are precise, concise, and logically sound. You are strongly encouraged to pursue more mathematics.

If you receive an ‘A’: You have mastered almost ALL of the learning goals of the course though you may not fully understand the ‘larger picture’. You tackle new problems presented to you though you may struggle with them for a while first. You sometimes make algebraic or computational errors but your work is still easy to understand. You usually correctly use the notation that was taught in class and your solutions are precise, concise, and logically sound. You are encouraged to pursue more mathematics.

If you receive an ‘B’: You have a solid command of most of the learning goals and are able to complete all the basic problems presented to you. When presented with more challenging questions, you often have a good idea of how to start, but your solutions are incomplete or not logically sound. There are often computational or algebraic mistakes in your work, but they’re not overly serious and do not drastically change the solutions. You usually use notation correctly, but your solutions are not always the most precise and are often disorganized. You’re encouraged to pursue more mathematics, but may need to improve your study habits to succeed in the more challenging courses.

If you receive an ‘C’: You have a basic understanding of many of the learning goals and are able to complete most basic problems presented to you. You almost never get very far in solving the more challenging questions presented to you. You need more practice with basic skills and you often make computational and algebraic issues that often make your work difficult to understand. Your solutions are usually quite convoluted, but the basic ideas are usually correct. You will likely struggle in courses that have this course as a prerequisite unless you make significant effort on your own to developing your understanding. If your're not willing to put in this additional work, you should try to avoid pursuing more mathematics.

If you receive an ‘D’: You have demonstrated a bare minimum understanding of some basic learning goals in these courses. It is likely that you can correctly take derivatives of simple functions, for example, and that you can successfully solve a selection of base-level calculus problems that require only one or two technical skills to solve, but fail to solve any problems of even a moderate difficulty. You may have serious deficiencies in algebra. You have passed, but you have a high likelihood of failing any course having this one as a pre-requisite.

If you receive an ‘F’: You do not demonstrate even a bare understanding of most of the learning goals. You are not prepared to use the material in future courses and would need to re-take this course in order to continue in any degree program requiring it.

Q 2. I failed this class. Where do I go from here?

A: The good news is that, under most circumstances, a couple failed courses on a transcript (especially in first/second year) will not seriously affect your career opportunities. There is still plenty of time for you to learn from your ways and do better in the future. If you’re serious about your education, you may need to drastically rethink the way that you study.

One word of encouragement that I would give to anyone who fails a math class (especially in first year): I truly believe that you’re in a better position than students who receive a C/C-/D in the class. Those students have passed yes, but they are very likely to experience great difficulty in future math courses and may never have the opportunity to truly understand the material. You on the other hand, have the opportunity to start again with the clear advantage of having seen the material before and you should already have some sort of idea of how all the pieces fit together. As hard as it is to think this way right now, try your best to view this situation as more of a blessing than a curse.

Q 3. Why do so many students fail math classes?
I think that I speak on behalf of 99% of instructors when I say that we are never actively trying to fail anyone. Indeed, I would love to see every student in my class master the material successfully and get an A+ in the course. The downside of the teaching role unfortunately, is that we must enforce the learning goals in our courses, which often means that we have to assign a failing grade to those students, who in our point of view, through the assessment of exams and homework, have not demonstrated that they understand the course material. Artificially assigning a passing grade to those students would simply be setting them up for failure in future courses or even failure in their career. Ultimately, the ‘F’ grade is there to protect the student.

Q 4. Are you trying to fail a certain percentage of us?

No. At least at the math department at UBC, there is no quota for the percentage of students that should fail any course. The difficulty of exams, homework, and the scaling of the overall grades are ultimately up to the instructor in charge based on their standards of the level of learning that needs to be achieved for a passing grade. Obviously, this is somewhat of a grey area and can shift slightly year-to-year and unfortunately, there is no easy way to standardize this. As objective as mathematics is supposed to be, it is often quite a subjective process determining the difficulty of exams, grading rubrics, and learning objectives. I at least, promise to strive to be as consistent and transparent as possible.

To try to give a somewhat concrete answer to the question, my goal (for an entrance level calculus course) would be to have an average between 65% and 70% after scaling. The scaling scheme (see questions about scaling) would then determine the number of students who fail the course. The percentage of such students typically falls in the range of 10-15%.

Q 5. Are the grades ever scaled in this class?

A: Sometimes, yes. Scaling (some people call it curving) usually happens at the end of the course (after the final exam). But sometimes we will scale the marks on individual midterms depending on the results. Though this is usually only done if the grades on a test are significantly lower than expected. It is never my intention to design a particularly hard exam just to make students feel like they need to work harder. I don’t think this form of encouragement is particularly helpful.

Q 6. How is scaling done?

A: Usually, we will scale in a piecewise linear fashion. For example, a function like this:

\[ f(x) = \begin{cases} 
6 & 0 \leq x \leq 50 \\
\frac{3}{5}x + 20 & 50 \leq x \leq 100 
\end{cases} \]

Here \( x \) is the student’s score before scaling, and \( f(x) \) is the students score after scaling. So in this particular example, a student who scored 50% gets scaled to 60%. The exact formulas aren’t exactly important, but the general properties are important. Here are some of those properties and their reasonings:

- Students who got 0% before scaling stays at 0%. Such students show no understanding of the course material and should not receive any marks.
- Students who got 100% before scaling stays at 100% (obviously). Such a grade demonstrates mastery of the course material.
- The order of grades is maintained: If Alice did better than Bob before scaling, she will do better than him after scaling.
- Everyone’s grades either go up or stay the same. I will never scale grades down (see next question).
- Some students will see higher gain in their marks than others. Those who see the highest gain are those nearest the median. This is a byproduct of having 0 and 100 as fixed points.
Q 7. Do you ever scale grades down?

A: If the decision is up to me, I would never scale down. I think that scaling down is manifestly wrong in every circumstance. Scaling down is either (a) a sign that the professor was not adequately prepared, or else (b) the students generally mastered the course material. In neither of these situations should the students be punished.

Q 8. How many questions are on the exam?

A: No answer that I could give to this problem would affect your study habits in any way. Moreover, I don’t think that the answer to this question at all indicates the difficulty of the exam. For instance, I’ve seen final exams with 4 questions that was leaps and bounds more challenging than some final exams with over 15 questions. If I was told that a final exam had only 4 questions, I would have fallen into a false sense of security and thought that the final would have been far easier than it really was.

With all that in mind, you should expect midterm exams (~ 50 minutes) to be around 5 questions, and final exams (~ 150 minutes) to be roughly 10-15 problems. Some problems may have several parts.

Q 9. How hard will the problems on the Midterm/Final be?

A: There will of course be questions of varying difficulty. Here is the general breakdown of that arrangement:

Since a 50% is a passing grade, you should expect about 50% of the marks to come from questions that are testing the bare minimum learning goals. These are so-called D level questions. That is to say, if you are just trying to pass the course (and therefore obtain a D in the course), then you need to have a surface level understanding of all the learning goals. D-level questions should be extremely similar to questions from your homework. To get a D-level question correct, you may have to apply formulas learned in class, but you may not understand why those formulas work.

Another 30% of the grades on the test should come from B/C level type questions (to separate the D students from the B and C students). Such questions should still be similar to questions seen before on homework, but with a slight twist, significantly different wording, or a combination of multiple different questions into one.

The last 20% of the grades should be A level problems, meaning that if you can consistently do A level problems correctly, you should get an A in the course. Such problems should look new to you, and should often combine multiple different aspects of the course. You sometimes will have to apply what you’ve learned in class to make a higher-level conclusion. Often, when grading these questions, we’ll see a majority of the students get 0 marks awarded, and I think that is OK. The goal of these problems is not to give “free marks”, but rather, to separate the good students from those who have genuinely mastered all the learning goals. If you are a student who is just trying to pass, try to identify the A-level problems quickly and spend no time trying to attempt them.

Q 10. Why was our exam so much harder than the practice (or previous years) exam?

A: This is a complaint that is heard from students year after year (and I am certainly not convinced that course material always increases in difficulty). The more likely reason why you found our exam more challenging than a practice (or previous year’s) is that you were not faced with the same time pressure and stress when practicing vs when you were writing the actual exam. You also probably did not write out all your answers in full detail as if they were being graded, which may have lured you into a false sense of security about the difficulty.

Q 11. How should I prepare for the exam?
A: You should begin by completing all the assigned (and suggested) homework problems. If it has been several weeks (or more) since you solved those problems, then you should go back and solve them again. These questions were specifically chosen by your instructor(s), and should therefore give you a strong indication of what questions we think are important. Do not suffice yourself with just looking at the questions and thinking “these are easy, I don’t need to do them”. Instead, write out your answers as if you would on an exam.

After you’ve reviewed all the homework problems, turn to the lecture notes, textbook and past exams for this course (if they’re available). The eager student can always find more study material. If you really think you’ve exhausted all the resources available to you, just ask me for more and I would be happy to find some for you.

Q 12. How do you grade exams?
A: My main goal when grading exams is to be fair and consistent. I am rarely concerned about the exact distribution of grades when I am marking, as this can usually be corrected for after (say if the grades are too low because I marked too strictly or the exam was too hard). When I first collect a pile of exams, I flip all the first pages over (so that I do not see students names). I then grade all the question 1s as consistently as possible (often going back to the first few exams that I marked to ensure that my grading scheme has not changed as I went along). Then I’ll reshuffle the exams and do the same thing with the question 2s, etc. I should only see what names belong with what exams while I am entering the grades. I always triple check that grades are entered correctly, but if I should ever make a mistake with this, please let me know ASAP.

Q 13. I know/suspect one of my classmates cheated on an assessment. What should I do?
A: I take academic misconduct extremely seriously. If you know or suspect that one of your classmates has cheated on a test, you should inform me right away. I will follow up with said person and take all measures that I can to ensure that either (a) they did not cheat, or (b) that their actions face the full consequences. Do not feel at all ashamed if you report a suspected cheater and do not hesitate to voice your concern with me if you think there is a potential for cheating to take place. A small group of dishonest students can greatly inflate the average, thereby artificially lowering everyone else’s grades in the process and I will not stand for it.

Q 14. Should I buy a calculator for this course?
A: No. Calculators are not allowed during examinations, so you should get used to working without them during your practice as well. If you do need a calculator for a computation, there are plenty of free ones (or like $18) that you can get on your phone, and if you need a graphing calculator, there are none better than Desmos (which is also free).

Q 15. Why aren’t calculators allowed on exams? I like having the security and being able to check my computations.
A: A math course at the post-secondary level should not be testing your ability to perform complicated algebra or computation. As such, there should be no questions on the exam that require the use of a calculator. This is of course taken into account when designing problems for your exam. If a question asks you to simplify your final answer, then you can expect that the work needed to simplify is either very elementary algebra (with whole numbers or else very elementary fractions) or is directly tied with the learning goals of the course (for example, simplifying \( \sin(\pi) = 0 \)). If a question says that you can leave your answer in “calculator ready form”, then it is perfectly acceptable to not simplify things like \( 2^5 - 10 \) or \( \frac{155}{37} \).

Of course, there may be questions in which a calculator would be helpful, but these problems should be testing your knowledge of a particular aspect of the course. For instance, you could use a calculator to check that \( \log(e^5) = 5 \), but doing so does not demonstrate your knowledge that \( e^x \) and \( \log(x) \) are inverse functions. Moreover, you may be asked to sketch a function using properties of derivatives that we have learned in
class. Disallowing calculators helps to ensure that no students are using a calculator with graphing capability.