

Unsolicited Advice on Taking Technical Classes

Josh Clinton

Vanderbilt University

As some of you may have had very little exposure to technical (i.e., “math-y”) classes prior to beginning your graduate student adventure, here is a workflow that my graduate student friends and I found useful when we were in graduate school. Feel free to amend or disregard as needed, but it resulted in good outcomes for us. (To be fair, it is impossible to determine causality given the lack of random assignment to the workflow described below.)

1. **Buy Two Notebooks:** One labelled “Class Notes” one labelled “Complete Notes.”
2. **Read the Material Before Class:** Prior to coming to class, be sure to read the assigned reading covering the topic. It is likely that you will not fully understand what the material covers and you may be confused about concepts, proof techniques, and the relationship between concepts. This is to be expected – do not be discouraged. The goal of this initial reading is to provide a sense of what topics the lecture is going to cover and to get a general sense of: the important concepts of interest, the main take-away point of each chapter/section, and how the new concepts relate to earlier concepts. In sum, the goal is to create a tapestry of the the material – a tapestry that likely has gaping holes where you were unable to follow the material in the text. It is perfectly acceptable to have large holes in the tapestry – the important point is to *know* not only that you have holes, but also to identify *where* those holes are in the tapestry of material. You can take notes on the reading in the “Class Notes” notebook, but unless you understand what you are writing down, at this point it is probably best to write down the general concepts being discussed and describe how they relate to one another (e.g., in lecture 1, the concepts might involve: Defining events and combinations of events, defining a probability measure to map these events into the set of reals $[0, 1]$, computing probabilities when the events are equally likely).
3. **Attend Class and Take Notes:** Come to class with your “Class Notes” notebook. Take notes. For purposes that will become clear, slightly messy handwriting on the part of the instructor is pedagogically ideal (or, perhaps a rationalization for the writing of yours truly). Instructor handwriting that is too messy provides a set of “Class Notes” that are likely illegible and uninformative; instructor handwriting that is too neat may tempt you to treat the “Class Notes” as “Complete Notes” in a moment of weakness. Instead, realize that your “Class Notes” likely contain a few errors – either in translation from “Instructor Chicken-Scratch” or, hopefully less frequently, Instructor Error (it sometimes happens when you are teaching material that you do not use on a daily basis). Class is an opportunity to get another set of notes and the opportunity to fill in the holes identified by Step 2. Some people are able to simultaneously learn and take notes at the same time, but this is usually rare. In my experience, most learning occurs outside the classroom.
4. **Create the “Complete Notes:”** After class, sit down with the textbook and the class notes and copy the notes from “Class Notes” to “Complete Notes.” Think of this stage as reviewing what we covered in class. You should only copy that which you understand – you should know how (and hopefully why) each step is there (although the class lecture is sometimes more pedantic than needed). This is where you catch

the errors noted in Step 3. Consult the text when creating your “Complete Notes” – hopefully the process of copying your lecture notes will enable you to comprehend the material that was not so transparent in Step 2. If you cannot understand a section after trying, leave a blank area in your notes sufficient to include that section and see if it is possible to proceed further. This is a very intensive process and it is at this stage that learning typically occurs and the ”Ah-Ha!” lightbulb switches on.¹

5. **Complete the “Complete Notes:”** We had a bi-weekly (and sometimes weekly depending on the material) study group in graduate school. This is when everyone gets together with their text, “Class Notes,” and “Complete Notes,” and helps to fill in the holes of each others’ “Complete Notes.” Much complaining about the poor quality of the text (but hopefully not the instruction) is also usually present to relieve the stress accumulated during Step 4. This gathering helps provide more perspective and alternative copies of “Class Notes” – people close to the front may, but hopefully don’t, have a very different set of notes from class relative to those of you located way in the back of the room. The goal is to hash things out and make sure that everyone understands what is going on, or to identify where everyone is confused.
6. **Complete the “Complete Notes” (part deux):** If your study group cannot reach consensus on an issue then schedule a meeting with your teaching assistant to go over the material and resolve the points of confusion. Briefly describe the nature of the question to the teaching assistant and set up a time to meet. (You can also meet with the professor, but they may be slightly more busy.)

¹Should you \LaTeX these notes? I would say no. Your first year is really hectic and fighting with typesetting is the last thing you need to do. That said, it may be a useful way to review if you are taking the Comps – translating you “Complete Notes” into \LaTeX .