

Welcome to Amath 351. This class is very much like Math 125. In many people's mind, it is full of tricks and methods that are not intuitive. My goal is to convince you the opposite. These "tricks" all have reasons and central logics hidden behind. Sometimes, it is because we don't know enough (math or theories) to really appreciate *why* they work. We then tend to only remember *how* they work instead of seeking reasons. That is not a good way of learning.

- Grasp the essential logic behind

We shall never stop asking *why* if we really want to understand the subject. In this class, I will try to introduce solution techniques with reasons provided and emphasize more on the logic behind (instead of making you very familiar with the tedious algebraic calculations). Along the way, inevitably, the calculation can get messy. However, we shall not be "kidnapped" or "frightened" by the complicity of algebraic calculation. The thought process and logic for solving the same type of problems, whether they are easy to computed or not, are all the same. We just have to be patient (and collaborate with calculator, Wolfram Alpha, Mathematica or your friends that can do algebra quickly)!

When we run into a new type of problem, the first strategy we try to solve it is always the same:

reduce the new problem into one you already knew how to solve.

This is true in applied math or any science or engineering subject. One shall always keep this in mind! In fact, throughout this class, we will gradually extend our "space of solvable problems". In other words, the content is extremely accumulative (another feature that is like Math 125). For this particular reason, it is important that one makes sure one doesn't fall behind.

- Don't let questions go

To do that, students are highly encouraged to ask whatever questions they have in-class and during office hours. Do NOT think your questions have the potential to be dumb questions. People all have different backgrounds. Questions show up either (in most of the case) because the instructor didn't do a good job presenting the concept or because there are some concepts required that one is not familiar with. In the latter case, just find what that is and learn it rightaway! The worst choice is to "accept" the new concept with questions and "remember" it. Without understanding the concept/logic, we usually forget the content very fast. Therefore, whenever anything is unclear to you, just ask! Usually, when you have a question, there are at least five more people having the same questions.

Another important thing is to be honest to yourself on whether you understand a concept or not (it sounds dumb and it is actually really hard, at least to me). If someone (in most of the case, myself) asks you whether you know a concept or not, just answer it honestly. The worst case is you think you understand it but actually you don't. You won't make progress in that case.

- Homework

That is why we need to do homework (mostly by ourself). Collaboration is definitely highly encouraged. From talking with your friends and classmates, we can learn more either through explaining to others or through getting questions answered from others. However, don't fully rely on your classmates. Homework is your opportunity to actually check your understanding, and based on the questions asked, review the material we have

covered. I will suggest people work on themselves first, perhaps through the weekend, and try as much as they can. And gather together sometime during the week days to talk to each other and check your works with each other. If you learn to solve problems from others, do NOT just copy what people have. Understand the logic of solving the problem and do it on your own!

In some of our homework problems, (almost) no partial credit will be given. This is because these are usually questions like solve this equation. You can very easily verify your answer by plugging in your solution. Also, you can always check your answer with your classmates/friends. More importantly, this (hopefully) would cultivate your habit of checking your answer, which is extremely helpful during taking exam.

- Examination

Here are some suggestions on how to prepare for an exam. We usually have to

1. **self-evaluate and pick a target grade.** Since we usually only get 80% or 90%ish of our aim, we can start by setting our target a bit higher.
2. **Make a study plan based on the goal.** This is not necessary. But as a busy undergrad, you usually have limited time on preparing exams. So know how much time you have and make a study plan. If you find that your time is not enough, you may want to lower your target grade.
To actually establish the study plan, you need to
 - (a) know which part of the material you are focusing on and which part you are neglecting.
 - (b) really understand the concept from the note you took in-class and do some practices. Don't do tons of repetitive practices. If you get the concept, the same type of practice problems can be skipped after doing about three of them.
3. **Modify your plan on the way.** Usually due to bad estimation on how much time we spent, you may need to modify your plan or even your target grade.

Also, start early. The best strategy is you keep getting your questions answered along the way and by the time you need to study for exam. You only need to do an overview to have a comprehensive understanding and do some practices. Do NOT think you will have plenty of time before the exam to clear your confusion. You don't.

During the exam: before you start, take a quick look at how many questions you have and what are each questions about. Estimate how much time you can have for each questions and keep track of the time. When solving each problem, think a little bit before you go into the possibly messy algebraic calculation. Think about your strategy, what do you expect during your solution process or at the end of your calculation. Do calculation slowly (have organized and clean writing is definitely helpful for later "debugging"). Importantly, everytime you have an answer. Check your answer by direct plugging in to the equation or some intuition. If you have checked the answer and are sure you get it right, you don't have to bother it anymore, which is good! Also, if you have time after you finish, carefully check your answer from those you are not that sure about (you should have some * or skeleton head or some special mark to indicate those not-so-sure problems). Do NOT turn in your work early unless you are 100% sure about your answer.