

Automate Your Learning and Build a Bulletproof Study System: The Consolidation Method

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I'm embarrassed. And ashamed. But I guess it's time for the world to finally see who I truly was back in college...I was... a NOTES NERD!

Yes, one of those extreme students who made sure to always carry at least 4 colors of pen, a straight edge, and a clean, clearly-labeled notebook. Someone who thought, "If I just make the most beautiful notes in the world, that I could always refer back to, all would be well..." My delusional thought pattern went something like this:

Obviously perfect notes = perfect grades.

I'd be a friggin' genius later on when I went to actually start "engineering" things in the real world and other people would forget everything. But not ME! I'd have my notes, ready to whip out at a moment's notice.

My understanding of what it took to be an engineer (or do any sort of real world technical work) back then was totally skewed, but that wasn't the only problem. I also had a complete misunderstanding of the purpose of notes in the first place. Didn't I ever stop to think that maybe it's not about the information: that it's not about making pretty pictures and making sure you've covered EVERYTHING that comes out of the professor's mouth or your textbook pages? *"We live in the age of Wikipedia and Google you idiot!!!"* Is what I would tell my younger self now.

Notes are not about simply recording information, but about ACTUALLY getting new information into your head.

Yes, you want to be on top of what the professor is saying, but better to actually LISTEN and take down notes on his key points, than act like a copying robot, making sure the spacing on your graph is perfect, and that you select the correct color of pen with the appropriate weight for drawing a parabola. Ridiculousness is all I have to say about how I used to behave. Spending hours after class going back through and re-organizing my notes meticulously until I was satisfied with their prettiness and organization. Just think, if I had spent that amount of time on something that was actually productive – i.e. actually doing practice problems, or preparing for exams, or doing projects early rather than cramming everything into 16-hour marathons at the last minute.

Here's a depressing calculation:

Based on the amount of time I estimate I spent organizing my notes...

1 hour per class x 2 classes per week x 16 weeks per semester x 4-5 classes per semester x 8 semesters = I "WASTED" 1,152 HOURS!!!!...just because I was being obsessive.

Now, that time wasn't totally wasted, I'll give myself that much. There are certain aspects of what I was doing (actively reviewing the material and figuring out how to organize the information better) which were right-on, and we'll talk about those in a minute, but I want to make this clear up front:

Notes are useless unless they are helping YOU LEARN. And the Pareto Principle applies here big time. [The **Pareto principle** (also known as the **80–20 rule**, the **law of the vital few**, and the **principle of factor sparsity**) states that, for many events, roughly 80% of the effects come from 20% of the causes.]

Now things have changed though. And I can serve up my own errors as an example for other students so that you don't make the same mistake I did.

Why is this so hard?

For most of us, the problem with studying isn't that we don't want to do the work – it's that going in, we're not actually sure what we need to be doing to best prepare for the exam.

"What do I need to do day in and day out during the semester to make sure I have the best chance possible of learning the material and getting an A in the course?"

Today I want to talk about notes.

"I feel like writing notes is a waste of time for me and this is probably the biggest problem I have. I previously wrote out everything I needed to know on flashcards and busted my way through those to get all the knowledge into my head. I didn't have much of an understanding for the topics but I could regurgitate the information which was all you really needed to do for the exams." ~a frustrated student

For those of you who fall a bit on the disorganized side, they're the bane of your existence. For those of you who are a bit more anal (like I was), you probably spend hours and hours re-organizing, color-coding, and immortalizing everything that comes out of the professor's mouth. No matter, everybody always seems to want to know: "Dude, so how do you take notes for this class?" I'll give my answer in a second, but before that let's put some constraints on ourselves:

#1 – All study time is not created equal

There's only so much you're ever going to get out of reading the text, reviewing your notes, listening to lectures, etc. Active use of new material is what cements it into your memory, not passive review. So not only do we want to use this to our advantage when studying, but we also want to keep this in mind when designing a note-taking strategy.

#2 – Each active/rest cycle consolidates learning

When you're actively concentrating, your brain is in focused mode, and you're concentrating on new material, forming new connections. Stay here for too long though, and you burn out on that new memory. The good news is, when you're not actively concentrating and are relaxed or performing automatic, rote activities, your brain is in diffuse mode, and is working behind the scenes to sort through your new neural pathway you just carved out – forgetting the unimportant stuff, and re-formulating the key ideas into a useful framework. So the more cycles of short bursts of hard focus, followed by work on other subjects or rest we can engineer into our schedules, the better off we are. Which also ties into:

#3 – Chunking

Chunking is what happens when your brain solidifies a new memory pattern. It organizes related information into a framework, which can then be stored away and tagged with a cue. This spares you mental energy to now go work on other stuff, which can also be added to your "chunk." The more chunks you make, the more quickly and efficiently you'll be able to bust out equations, problem solving methods, and explanations later on.

Okay. So given that, we want a note-taking method that...

- is time efficient
- maximizes our number of focused/diffuse cycles
- maximizes the number and size of our information chunks

Here goes...

The “Get-It-All-Down” Principle

Trying to take notes perfectly is a barrier to learning. You become so focused on keeping everything organized, that every time the professor makes a mistake and goes back to correct it, or erases a graph before you’re done copying it diligently, it throws you off your game. Plus you’re not present in the discussion, focused on the concepts being presented – instead spending your hour in class as a transcription robot. This is bad news for learning... and it’s a waste of your time. Instead, you should be focused on just getting it all down.

It doesn’t matter if it’s messy or disorganized, just that you can read your own writing for later. Ignore taking notes on background, history, and derivations (waste of your time), and focus intently on copying down every step of example problem solutions, key equations, and key graphs/diagrams (this is where the meat is). You can do this, because the second phase of our system (The Consolidation Method) will iron out all of the messiness, leaving you with an organized, personalized, and seriously condensed set of notes.

The “Get-It-All-Down” Principle in Action

To demonstrate this we’ll go through an example, assuming we’re taking a Physics 1 course, which meets for a 50 minute lecture on Monday, Wednesday, and Friday.

So let’s say, this week in class we’ll be covering concepts related to projectile motion, displacement, and velocity. As I sit through class on Monday, the lecture covers a lot of different ground:

- explanation and diagrams on what a vector is
- how to calculate what the components of a vector are
- a projectile example problem
- a derivation of the vertical displacement equation

I’m going through and copying down what I think are the key elements per our “Get-It-All-Down” Principle: key equations and diagrams of vector addition, trig, and motion, each problem solving step from the example problems with my own notes clarifying certain steps...

And by the end of class I have 4 pages of somewhat messy notes that track the progression of the concepts explained in lecture. Obviously not ideal for relating concepts together and doing complex homework problems, but good enough for now.

Wednesday’s class covers calculating final velocity vectors of projectiles, and using different types of vector notation. Friday’s class covers optimizing launch angle for projectiles and another example of how to calculate hang-time.

There were less key items to copy down on Weds and Fri, so use your discretion – not all classes have to result in pages and pages of notes.) Okay phew! Made it through the week...

It may not be the prettiest or most organized collection of notes, but I know everything important from class is there, which is our primary objective at first. Now comes the fun part...

The Consolidation Method

What we’ll do now is what I call The Consolidation Method: a stress-free, automated way to take notes and study throughout the semester. The idea behind it is this:

Each time you re-organize your notes, you’re doing the same thing in your brain. You’re reinforcing the important information into chunks, connecting it to your existing mental

models. This makes the information faster to retrieve because you've packaged it more efficiently. Eventually, the goal is just 1 PAGE OF NOTES (yes you read that correctly). When you get your whole semester down to 1 page of notes, you'll be able to visually recall almost any concept from the course, which will then unlock a huge chunk of information that is stored along with it in your memory bank.

As learning researcher Daniel Willingham advises, "I tell them to put the notes aside and create an entirely new outline, reorganizing the material... It forces you to think about the material again, and in a different way." Okay, so how to approach this? In general, you'll need two types of consolidation sessions:

Weekly Consolidation Sessions, where we'll take everything from class during the week and reorganize it onto 1 sheet of paper. And *Pre Exam Consolidation Sessions*, where we'll take all of our weekly 1 sheet summaries and consolidate those into a 1-page exam study sheet.

Weekly Consolidation

So jumping back to our Physics example, now that we've got all of our notes for the week, the best time for us to do our weekly consolidation is on Saturday or Sunday. This gives us time for the new material to sink in, to let our subconscious work on it for a bit, so that once we come back to it on the weekend we'll have a better perspective on what's important and what's not so critical. All in all, this should only take about 30 minutes per course.

The process goes something like this:

(1) Take the notes you took during the week, and spread them out on the floor or a table and start organizing them by concept ("chunking it down" as they say). There's no real science to this, but you want to try and organize say, in our physics example, vector math into one group, motion equations and diagrams into another group, and then special cases of projectile motion into another. Here's what this might look like:

Once you have everything grouped in a way that makes most sense to you, then here comes the tough part – (2) consolidate it all onto 1 SHEET OF PAPER.

In math-based courses like this, I like to use diagrams with symbolic labels, and equations with short notes – so that I can get it condensed down pretty small, but still in my own head know what's going on. I can always go back and work through the concepts on this sheet in more detail if I feel a piece of my understanding is missing, but as it stands this is a HUGE upgrade from having to sift through 9 pages of dis-jointed notes which lack the clarified, organized pattern that I've now created for myself in just 30 minutes.

Ultimately, what we're doing here is engineering "studying" as we think of it in the traditional sense, into our weekly routine – forcing ourselves to engage with the material just enough, so that we don't have to learn it all over again by the time the exam rolls around (conveniently avoiding those late nights of agony at the library pounding energy drinks, wondering if we'll be able to scrape by with a passing grade).

Okay so that's our weekly routine. But what happens when the first exam rolls around?

Pre-Exam Consolidation

Now that you have each week of class on 1 sheet of paper, the next step is to take all of those weekly summaries, and prior to your exam, condense all of THAT information down to 1 sheet of paper in the same way as we did before.

The same process applies here, but now you have to get REALLY creative with how you represent different equations and concepts. It might just be one diagram with a few labels and equations that represents what was covered for 2 full weeks of class.

Again, the organization on the paper is going to represent organization in your brain.

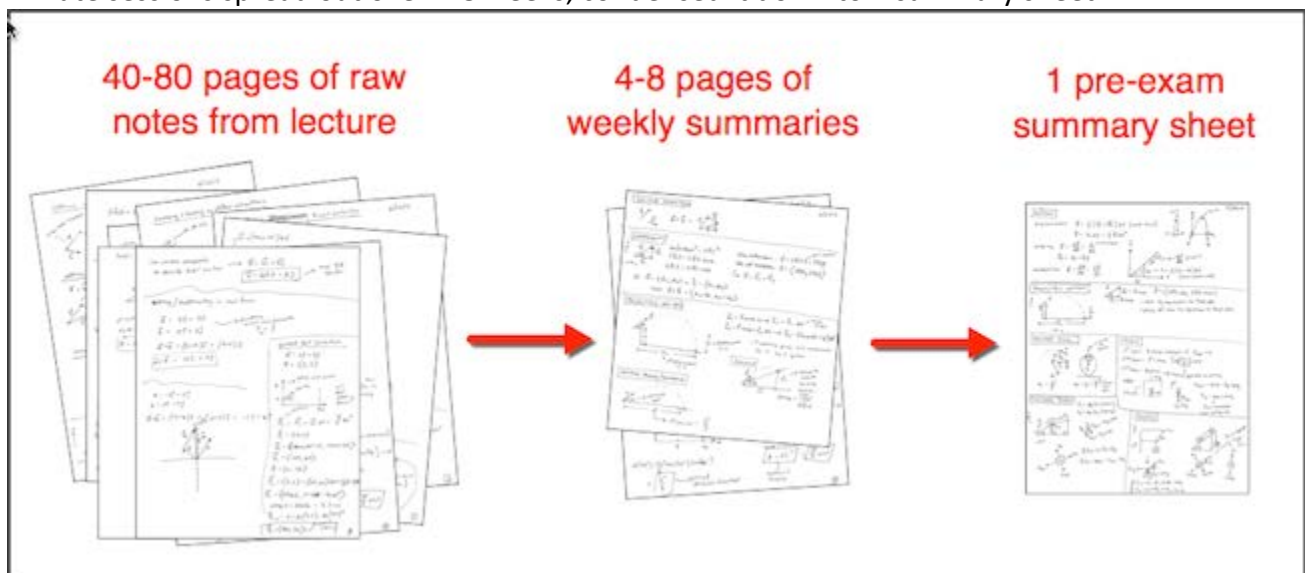
If you can wrap your head around getting all of the information covered over a 4-8 week period onto one sheet of paper, it's a good bet that that information is nicely and efficiently stored in your memory as well, allowing for quick access during exams.

I've basically combined all of the vector-related material with all of my motion equations. I've held onto my key projectile motion diagram, along with two bullet points that represent the key problem-solving steps for those types of problems.

I've followed a similar pattern with centripetal acceleration, force, inclined planes, and tension, drawing a key labeled diagram, along with the key math representation.

****NOTE:** *You have to do this yourself. If you try to short-cut the process and use someone else's summary sheets, you'll quickly find yourself lost as all hell, unable to understand the hieroglyphics presented before you. The material in this short-hand form only makes sense to you because you've been through the mental work of organizing it in your head and chunking it into a condensed set of symbols, diagrams, and equations.* **

Follow this process through, and VIOLA! You've "studied" all of the concepts you need to know on the exam. You've probably taken ~40 pages of raw class notes, and in just a handful of 30 minute sessions spread out over 4-8 weeks, condensed it down to 1 summary sheet.



As amazing as that feels, keep in mind that you're not quite ready to go running off to take your exam just yet. We've still got a ton of work to do to actually prepare for the rigors of solving the problems that show up on the exam, but this is the essential first step: making sure you have the conceptual understanding and can relate that understanding to the correct symbols, equations, and relationships you need to solve the problems that you'll be faced with.

Plus, as a bonus, you'll be left with a super-sweet equations sheet that you can take with you on the exam for you lucky souls with professors who allow that.

The Rewards of a Rock-Solid Study Process

Now, did I follow this exact process when I was in school? No.

What I did makes overkill seem like an understatement. Granted I did do very well, but those textbook-quality diagrams certainly were not the reason why. But here I've extracted for you what I think are the key principles of taking effective notes and automating your study sessions so that you'll be just as prepared as I was, without adding an extra 1,000 hours of misery to your college experience.

Think about this:

Imagine waking up to go to class knowing exactly what to look for, confident that if you just (legibly) get the key principles down on paper; you'll be set perfectly for deeply engraining those new concepts into your memory.

Imagine feeling like you're actually learning while you're in class – enough time to ACTUALLY LISTEN to what the professor is saying instead of racing to copy down everything he or she throws up on the chalkboard.

Imagine setting your notes aside during the week, and returning to them on the weekend for a short, focused, and stress-free 30-minute session where you rework the material in your head – organizing and simplifying so that the concept chunks perfectly fit your mind's eye.

And finally, imagine sitting down to "go through your notes" while studying for your midterm with your friends, and then getting up after a quick half-hour, to their shock and amazement, to go work on something else, or jump into practice problems that they aren't anywhere NEAR starting on. That's the type of semester a process like this can get you.

<http://lifehacker.com/get-more-out-of-your-notes-with-the-consolidation-metho-1716372981>