

Studying and Learning to Think Like a Physicist

Study Habits

The habits you set in the first two weeks will probably be with you for the semester. Set good ones. How do you set good habits?

Find a consistent place to work with few distractions (probably not your dorm room!).

Set aside time to work—preferably an hour to hour and a half every day.

Stay focused.

Give me data!

We're scientists. We don't want anecdotal evidence—we want data! What have previous experimental studies SHOWN to be effective for students?

1. Spend some time EVERY day on physics.

Because the material in physics keeps building on earlier material, if you fall behind, it can be very difficult to catch up. This even applies to one or two class meetings. If you don't understand Monday's material, Wednesday probably won't make sense either.

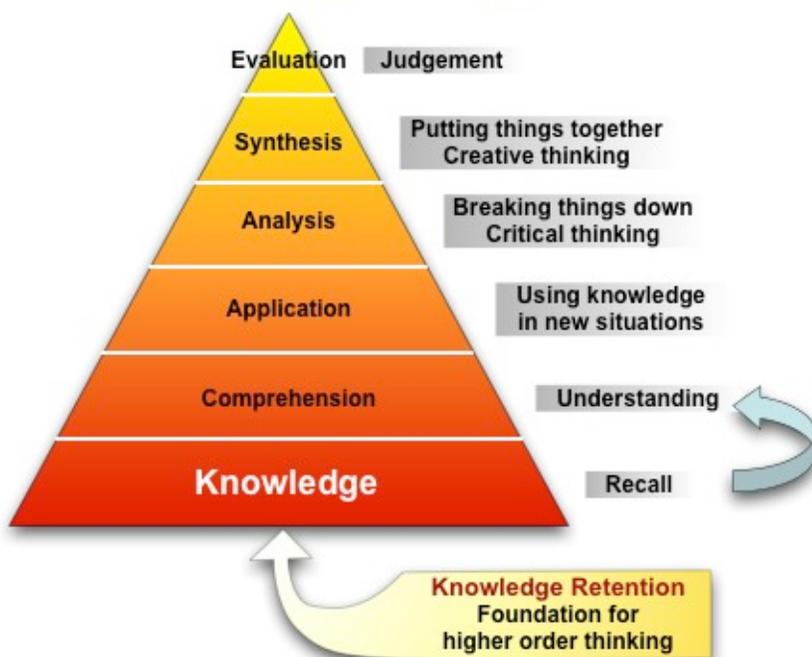
2. Review the concepts for 10 minutes just before class, and review what we just discussed for 5 minutes after class.

3. Form a peer study group.

Studying and problem-solving with peers requires you to explain your thinking & helps when you get stuck (as we all do). But everyone needs solo study time too—you don't learn if someone gives you the answer before you understand the problem.

We all know that it's best not to fall behind, but what if you do? Don't get so overwhelmed that you don't know where to start. Set a small goal, and spend one focused hour to accomplish it. Congratulate yourself, take a break, and repeat as needed.

Bloom's Taxonomy for Thinking



Bloom's Taxonomy describes different levels of learning and thinking.

Understanding how someone else worked a problem is not the same level of understanding as being able to work the problem yourself. Solving the problem without hesitation and being able to explain the solution to someone else requires another level of understanding.

Image from Dr Kelly Hogan, Dept of Biology, UNC-Chapel Hill.

Readings and Homework

The schedule shows the topics we will be covering in class each day and also gives you a reading assignment for each day. The schedule moves quickly through a lot of material. To keep on schedule, we all need to work together. (In case we don't stay on schedule, the updated schedule will be available online from my website www3.wooster.edu/physics/lehman.) Our time together in class will be most productive when you've read the assignment and tried some homework problems BEFORE class.

Many students don't like reading a science textbook or they report that they don't understand the material when they read the book. I find that reading a science book is very different than reading a social science or humanities text. I recommend the following technique:

1. Skim through the chapter. Read the introduction, and then just look at the titles of the sections (and subsections). Make an outline or concept map showing these titles.
2. Read through the chapter in more depth, but don't expect to understand everything on this pass. In the appropriate place on your outline/map, write down the definitions of any new variables (e.g. " $F \sim$ force"). Write down the equations that seem to be key to these new ideas. Write down words or key concepts as well.
3. Go to the example problem and cover up the solution with a piece of paper. Now, work the problem yourself. Wait until you get completely stuck or solve the problem to look at the explanation.
4. Skim over the chapter again, thinking about how the sections and subsections fit together and how the material relates to what we've already done.

I don't expect you to completely understand the material from reading the book before class. My goal is for you to be a little familiar with the words and concepts and for you to be able to figure out what part of the material is the most mysterious to you. That way, we can work together on the hard stuff in class, instead of spending class time on definitions and leaving you to do the hard stuff alone after class.

Remember that according to the College Catalog, "a course is defined as a unit of study which occupies one-fourth of a student's time each semester, or approximately twelve hours per week." For every hour you are in class, you should spend a minimum of three hours out of class.