

3. Literature Research

3.1 The Library

3.1.1 Use Your Library!

- When you write a scientific paper or give a scientific presentation, you are no longer a student, you are a (**rookie**) scientist. From scientist to scientist, there is one piece of sage advice:

Use your library!

- "Your" library, by the way, is any non-profit library in the world, e.g. any University or state library. They all will serve you, because they are all connected.

- In order to get the most out of your library, there is one more piece of advice:

Befriend your librarian!

- Even if the librarians you know in your (undergraduate) student mode evoke associations of **Norwegian Ridgebacks**, spouting fire and ferociously defending their golden eggs (in the form of undergraduate textbooks), this changes as soon as you approach them in your scientist mode. More likely than not, you will now find them transformed into noble and awe-inspiring **Hippogriffs**, able to leap tall stacks of books in a single bound, and eager to help you if you ask them (ever so politely, of course).

- Your librarian will be able to find and get you any book ever printed on this planet and, if you ask nicely, perhaps even books from other planets.

- However, they will not write a book for you. So better pay attention here.

Inside the Library: Books and Journals

- Your library contains information in various forms. Let's look at the most prominent ones:

- First we have the **"textbooks"**. Those are all books from which you learn your trade, i.e. books containing the well-known facts of your field; and you can usually borrow them for some time.

- Textbooks come in many shapes and forms, but they are either more basic (introducing the subject for the first time, not demanding any prior knowledge), or more advanced.
- Usually, there are always a few that are seen as "the" text book for generations of aspiring engineers and scientists. Take the "[Gerthsen](#)" for undergraduate physics, or the "Kittel" for solid state physics. Being "the" standard text book does neither mean that this book is the best (the "Kittel" certainly isn't (any more), nor that it is free from mistakes. A bet you never will lose is that any text book contains minor (or major) mistakes somewhere. This is unavoidable. Nobody writing a text book has the time to check very single number, every equation, every illustration personally (if one would do that the book would be completely outdated if it is ever published)
- Some "text books" have acquired cult status - but are rarely used anymore in actual lectures - e.g. the "[Feynman lectures](#)" or the "Gerthsen". They used to be textbooks but have evolved into a complete compendium of physics that everybody, who has actually studied physics once, now uses as a reference. After all, even a Physics Prof. does not remember everything about physics all the time.
- Materials Science is so new (in comparison) that "standard" or "cult" textbooks have not had enough time yet to evolve (maybe, the "cult" status will go to Internet Hyper"books" in this case).
- What does that mean for you? That there is always more than just one kind text book in your library (besides the one your Prof. recommended) and that you should check'em all. Learning styles differ as much as writing styles, and maybe you personally would be much better off with a different textbook than the one recommended.

Next we have **Scientific Books**. Those are books about some specific science topic. If they are new, they should lead you right to where the cutting edge of science in this field was about 1 -3 years before the publication of this book.

- Of course, a new "science book" could also be the text book of a really advanced specialized lecture course; and a somewhat older science book may still serve as an introduction into some special field, too
- In fast moving disciplines like Materials Science, "old" science books are quickly replaced by newer ones. Since the field of doing science for a living is highly competitive, fledgling junior scientists are more and more compelled to write science books as a career move. If that is an unmitigated benefit for science remains to be seen.
- What follows for you? First, whatever field you are looking into, changes are that your library has some books right there or can quickly identify suitable ones in other libraries. If you can get one of those books on loan depends on circumstances, but if you trust your librarian, you will always will get what you need.

Besides books, your library has **Scientific Journals**

- Journals usually appear once a month, and your library will have it the moment they are issued. In a journal you find articles from the cutting edge of science about 6 months ago. Usually, from the moment a scientific paper is submitted to a Journal, **6** month (give or take about **3** month) elapse before it is out in print. This is mostly due to the refereeing process described in [chapter 4](#).
- If you want to get a bit closer to the cutting edge of Science, you know have to turn your attention to the:

Letter Journals.

- Letter Journals usually come in connection with a regular Journal (e.g. "Phys. Rev. (= Physical Review) - "Phys. Rev. Lett." (= Physical Review Letters)) and are supposed to publish short papers (= "letters") quickly after submission.
- This is true for some Letter Journals (e.g. "Phys. stat. sol. - rapid research letters), but not necessarily for all. Some letter Journals have become so prestigious., i.e. have a very high **impact factor**, and thus a very tight refereeing process that it can take quite some time before your paper is actually printed (if is is accepted, which is statistically unlikely).
- What does that mean for you? As long as you're not one of the active players in a competitive research field it means almost nothing. If your literature search turns up an interesting paper in a regular journal or in a letter journal makes no difference - get it and study it.

Old Journals.

- Those are simply Journals from the years before the running year that have been bound (at considerable expense) and now are big solid books.
- Given the exponential growth of science and scientists, and the exponential growth of papers produced per scientist, it is an interesting exercise at this point to calculate when the tectonic plate you are sitting on right now will succumb to the exponentially growing weight of the collected scientific writings and sink into the magma down yonder.
- But don't despair! Thank God, or better thanks to Materials Scientists who have made the **CD**, **CVD**, and now **HD DVD** and so on (OK - with a little help from their friends in physics, electrical engineering, and so on), tons of paper with printed symbols on it now fit on a small light-weight disc. Of course, your library has that, too:

Digital Formats

- Your library does have digitally stored books etc., and you can access that directly with the PC's there. You do not only have access to whatever the library you happen to be physically inside does have right there, but you have access to all kinds of networks and data bases that you cannot get into from your own **PC** (because you do not pay large amounts of money for this privilege like your library!).

So, once again:

Use your library!