Websites full of awe.
Use them.
Be glad.
a guide by Chad Ostrowski

for students in Engineering Science
Relevance fading as of 23 September 2009
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about this guide

This guide will take you on a fast romp through the awesomer (awe-fuller?) parts of the interwebs. It assumes you’re an aspiring Engineering Scientist and will therefore have an interest in calculating numbers, looking up interesting data, researching trending scientific topics, and writing technical documents. So the awesomer online places shown to you will be of these natures.

using this guide well

Flip through. Read about sites that are interesting. There’s one per page, and you’ll be graced with a quick synopsis, a “Basics” section that explains more fully the purpose and depth of the site, and then a “Tips” section explaining useful things to note. The sites themselves are arranged chronologically according to when in your academic career you’ll likely find yourself using them. At the beginning you’ll find sites used to find general information and write papers; towards the end are sites more research-oriented for when you begin to write your thesis.

& without further ado!
Wolfram|Alpha

www.wolframalpha.com

Wolfram|Alpha is a "computational knowledge engine" that contains relevant data for nearly anything a person would care to look up.

Basics

Wolfram|Alpha, begun in May 2009, functions as a "knowledge engine". Rather than striving for the comprehensiveness of an encyclopedia, it fabulously delivers quick facts about nearly any subject. Additionally, as a free online calculator, it is unparalleled. Wolfram|Alpha will perform integrations, derivations, and will plot functions or complex numbers for you. Beyond the calculator functionality (which is enough reason to visit frequently), try typing in names (like Ryan or Verna), chemical compounds (caffeine or insulin), dates, constellations, or even questions. Names will bring up information about how many people have that name and when it was most popular to name a baby that; chemical compounds will bring up 3D representations of the molecule; dates bring up how long ago the date was, when it will happen again, major observances, and more; and simple questions will be answered (indeed, I refer to the service as "Wolfram|Alpha" and not "WolframAlpha" because asking it "What is your name?" returns "My name is Wolfram|Alpha").

Tips

- Pay attention to the "Assuming that _________ is a _________" text at the top. Typing in an equation with "i" will bring up "Assuming that i is the imaginary unit | Use i as a variable instead". Likewise, some names (like Chad) originally come up as something other than names—it assumes that Chad is a country when you first enter it.
- Have fun! This is a great resource with which to just play around and discover interesting facts.
KnightCite

www.calvin.edu/library/knightcite/

KnightCite is a reputable citation service that makes inserting citations and bibliographies super easy.

Basics
We can all agree that the great minds who blessed us with MLA, APA, Chicago, & various other guidelines for citing sources didn’t have our personal comfort in mind when doing so. But KnightCite does. At one point in history, we had to look up these guidelines in books! But now! ...There’s nothing to look up. And, unlike other citation-sites, you don’t even have to suffer through the inconvenience of drop-down menus: everything you need is visible at once. Simply choose what sort of resource you’re citing on the sidebar, click the format to cite in at the top of the sidebar (probably APA), and watch the fields in the main window adjust to meet your needs.

Tips
• Rather than letting you cite different types of online or in-print sources, KnightCite allows you to select a radio button and turn any in-print source into an online source.
• KnightCite doesn’t keep an ongoing tally of the resources you’ve entered thus far. Other citation services do. But if you’re citing things, you’re probably writing a research paper anyhow, so copying and pasting them will be a better plan than relying on the cloud.
AccessScience

www.accessscience.com

AccessScience is a great place to go for encyclopedic information about scientific topics. Before really digging into scholarly topics & journals, AccessScience is an efficient means of gathering general information.

Basics
Wikipedia is easy and memorable and subversive, but unfortunately also unreputable. Rather than using it for your first-round information, try using AccessScience instead. You'll get carefully moderated content (that only a few people can edit) about only technology and science (so you won't get distracted by comic book superheroes named "Bessel" and the like) and you can actually cite the articles in papers you write. In fact, you don't even need to use KnightCite for this, if you’re using APA format (chances are you will use APA or nothing. They make citations superbly easy by including a "How to cite this article" at the bottom of each one. Though the typical article doesn't link to quite as many sources as the typical Wikipedia article, it does usually include links to other related content (as opposed to the myriads of unrelated content you get on Wikipedia). Also, most of the sources the articles cite are textbooks, which could be very good or very annoying depending on your project.

Tips
- Use this on campus in a computer lab. Like other scholarly sites, it’s incredibly useful and knows it, so it charges you (a lot) for a subscription. Penn State already pays this fee on your behalf. If you live near/on campus, don’t bother figuring out how to access it at home (it’s painful) and do your work in a computer lab. It’ll be easier.
- The website is fairly fun to just browse! From the home page, click the links and explore the topics.
Statistical Abstract of the United States

www.census.gov/compendia/statab/

The Statistical Abstract provides statistical data from a wide variety of fields. Any time a report requires the inclusion of statistical trends in sales, emissions, water used, etc, this is the place to start.

Basics
For several classes, I was required to include information about trends in carbon emissions, petroleum use by state, etc. Had I known that this site existed, I would not have needed to hand-copy all of the information into a spreadsheet in order to make my graphs—it provides each statistical abstract in both PDF and MS Excel form. So, for instance, I just easily found data on our nations’ Carbon Dioxide Emissions by Sector and Source from 1980 to 2006 with projections until 2020. I can quickly view a PDF to see if it’s the sort of information I need, and then if it is, I can download the Excel file, which will provide much more detail (the PDF for this only includes select years from 1980 to 2020, the Excel file contains every year from 1950 to 2006 and projections out to 2030).

Tips
- Being able to download MS Excel files will allow you to quickly make graphs of the data, which is much more useful for most people than sifting through raw numbers.
- Check out the Science and Technology Employment statistics. They will tell you interesting things about your employment prospects.
The “Catalog” or “CGP”, as the cool kids call it, is the place to go for government publications from any of their departments (as long as it’s unclassified) and in any field.

Basics

On the main page, simply type in your research interest. If you’re looking for a particular journal or documents only from a certain geographical area or publisher, the advanced search will help you narrow your search easily. A search for “Carbon Nanotubes” returned eleven results. Clicking the first one, which happens to be about building Schottky diodes with single-walled CNTs, gives me a wealth of metadata about the article: Title, Author, Publisher Info, where to find it online, a Description, Series, General Note, System Details, Who added it and from which department (the Army Research Laboratory, for this one), where to find it in an actual library, various identification numbers, and more. On the advanced search, you can specify any of these fields. In the report on CNTs-as-Schottky-diodes, the incredibly-organized document contains information about proper use of the report, a list of institutions who received physical copies and how many, a list of the figures used in the document, and a comprehensive background-information section to bring you up to speed quickly on the topic.

Tips

• Save the report to your computer! Many of the articles take a long time to come up and it will be easier for you to access them quickly if they’re on your computer.
• Notice the way it reformats your search in the search bar. If you’re using this site heavily, it will save a lot of time to learn that you can, for instance, search by publication year by simply entering “& WYR = (2009)” rather than going through the advanced search. If it doesn’t understand what you enter, it will give you a list of terms you can use.
Nature publishes prominent research from scientists all over the world. While the journal simply titled Nature is the most prominent, there are many smaller journals that also publish articles relevant to certain fields.

Basics

Of most interest to you as an Engineering Scientist will be Nature Materials, Nanotechnology, Neuroscience, Photonics, or Physics. Probably. We’re a diverse bunch! For most Engineering Science research projects, you will want to search all of Nature.com rather than a single publication. A search for “Graphane”, for example, comes up with articles in four different journals (Nature itself, Nature Materials, Nature Nanotechnology, and Nature Chemistry). Engineering Science by design crosses the borders between different disciplines, so all the publications of Nature make a great companion. Nature can serve as your primary source of information for new happenings in your research area. Note that some of the articles are fairly difficult to comprehend, as they are written by professors and professional researchers themselves. However, Nature imposes readability requirements on those who submit papers, so it’s easier to read than other journals.

Tips

- Use the sources each article cites. There is no faster way to develop a strong background in your research area. Usually you’ll find that that the researcher-authors cite in excess of ten other high-quality papers, which Penn State also pays for you to have access to.
- Before you read through the article, open all of the figures in new tabs and read the captions. Most articles refer to the figures repeatedly throughout, and it’s good to have an idea of what they’re talking about beforehand and also much more convenient to be able to switch to a tab with a full-sized image rather than scrolling around to find a thumbnail.