

Instructions and Guidelines for Writing a Literature Review

Applied Physical Sciences

Why write a literature review? The literature review is intended to prepare you and your advisor for your research, your upcoming thesis proposal, which will take place towards the end of your second year and future publications. A good literature review will help you in getting off to a good start with your research and save you a lot of time (*Why spend a day in the library when you can learn the same thing by working in the laboratory for a month?* Frank Westheimer –American chemist). What are good research questions? What has been done by others in the field? What experiments should I plan and why? A good literature review will help you in getting a better understanding of the field you're working in and what skills you need in order to be successful. Perhaps you need additional courses or you may need to spend time with another research group to learn new synthetic skills that are critical to the research you want to do. You may need to learn how to use computational methodologies to analyze your data or you need training on characterization equipment that is only available at unique facilities such as Oak Ridge National Laboratory or Brookhaven Laboratory. Identifying those needs at an early stage helps in planning your research. Last but not least, it is also a great writing exercise!

What should I include in my review? Your literature review is not just a collection or summary of publications and patents. In order to benefit from your review, the following points need to be addressed:

1. What is the current state-of-the-art in your field;
2. What aspects are you concentrating on in your research and discuss the relevant literature in detail;
3. A mature scientist appreciates the groups that are doing work in various areas related to your research. So, it is important to be aware of the corresponding author on the literature you review;
4. Describe and explain relevant chemistry, equations, theory and methods;
5. Your review is allowed to be critical. It's OK (encouraged even!) to have an opinion on other people's work;
6. We only get credit in research for being "first". What are your goals for being first? Listing them is an important part of framing your research program.

How many pages should I write and what format do I need to use? This will change from group to group. Below are some general guidelines, meaning that you have to discuss the details with your advisor. Different research fields use different standards. Set-up a meeting with your advisor and discuss your literature review topic and how to format your review.

1. On the cover page list your name + student number, the title of your literature review, the research group you're in, and the date on which your literature review is submitted;
2. Format of your literature review: Abstract, Body, Concluding Remarks, References;
3. Use font Times New Roman, font size 11 and a line spacing of 1.5;
4. Total length of document should not exceed 15 pages;
5. Typical number of references listed 100-150;
6. Submit your review in a format that can be edited by the reviewers (e.g. MS Word, pdf).

Where can I find "the literature"? There are many different search engines available. Some are for free (Google Scholar, ArXiv and BioArXiv) other ones are only available via the University (Scifinder and ISI Web of Science). Google Scholar can be useful when you are starting your search within a topic that you are not familiar with. However, it is not well structured. Tools such as ISI Web of Science (ISIWOS) or PubMed are more thorough with

regard to the manner that they perform their searches and provide a set of tools that make your searches more powerful. For example, ISI Web of Science has Endnote built in, and you can readily move your search results from ISIWOS directly into your personal Endnote database. We recommend that you don't rely on one search engine only. Different search engines are better in searching the open literature but not the patent literature. Tip: a lot of search engines can be set-up to send notifications when publications become available that match your research interest. This is a great way to stay up to date on the latest research. Scientific journals will offer a similar service via E-mail notifications or apps (e.g. ACS Mobile, RSC Mobile, Nature.com).

Should I organize my literature? Keep in mind that your literature review is a living document. During your graduate studies, and perhaps even beyond, you will gather more literature and build a literature base that may easily exceed hundreds of papers and patents. Organizing this large data set from the beginning is a smart thing to do. You may want to use reference management tools such as EndNote (<http://www.endnote.com>) or RefWorks (<http://www.refworks.com>). Keep in mind that research fields have their own rules when it comes to formatting literature references. *Talk to your advisor and agree on which format you want to use as this will save you a lot of time.*

How will I be graded? Two professors will grade your review. One of them will be your advisor and the second reader will be a professor who is familiar with your field of research. This professor can be from APS or from another department. Your advisor will select the second reviewer. Within two weeks you will get written feedback from both reviewers. The review may be good as is and you will receive your grade or you will be asked to make modifications. We recommend you discuss the review with both professors in person. You will get two weeks to address the concerns and re-submit a revised version.

Please note that it is important that the literature review is your own work. It is not allowed to copy and paste text from the literature as this will be considered plagiarism. Plagiarism is not acceptable! For guidelines please visit: <https://writingcenter.unc.edu/tips-and-tools/plagiarism/>

Final grade: F (Fail), LP (Low pass), P (Pass) or HP (High pass)

Timing: After you finished your classes in Spring (medio May) we recommend that you work on your literature review over the summer. Again, discuss a timeline with your advisor and agree on which date you will turn in your literature review.

Websites and other resources: Additional information that may be helpful in writing a literature review, searching and organizing scientific literature:

Ten Simple Rules for Searching and Organizing the Scientific Literature by Denis C. Bauer
doi:10.1038/npre.2009.3867.1

Literature Review: Conducting and Writing
<https://libguides.uwf.edu/c.php?g=215199&p=1420568>

Tips for writing your first scientific literature review article by Emily Crawford
<http://www.asbmb.org/asbmbtoday/201112/Features/Crawford/>

Ten Simple Rules for Writing a Literature Review
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3715443/>