

Instructions and Guidelines for Writing a Literature Review

Why write a literature review?

The literature review fulfills the doctoral written exam requirement and is intended to prepare you and your advisor for your research, your upcoming first oral exam, and future publications. Students should demonstrate in the literature review that they have a broad understanding of their field and apply this understanding to define their research area.

A good literature review will help you in getting off to a good start with your research and will save you 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). You should consider these questions while you develop your literature review:

- 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 gain a better understanding of the field you're working in and the skills you will need 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 these needs at an early stage helps in planning your research. Last, but not least, writing a literature review is 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, it is important to address the following points:

- What is the current state-of-the-art in your field?
- What aspects of the field are you concentrating on in your research? Understand and discuss the relevant literature in detail.
- A mature scientist appreciates the groups that are doing work in various areas related to your research. So, it is important to pay attention to the corresponding author on the literature you review.
- Describe and explain relevant chemistry, equations, theory and methods.
- Your review can critically assess other people's work. It's OK (even encouraged!) to have an opinion on other people's work.
- We only get credit in research for being "first". What are your goals for being first? Listing these goals 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. It is recommended that you schedule a meeting with your advisor to 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 an unfamiliar topic. However, Google Scholar 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 use more than one search engine. Different search engines are better in searching the open literature but not the patent literature.

Tip: many 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).

How 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 the format you will use to organize your literature - this will save you a lot of time.*

How will my literature review be evaluated?

Three faculty will evaluate your literature review – (1) your faculty advisory, (2) your Doctoral Advisory Committee (DAC) Chair and, (3) one other DAC member. You will receive feedback within one month after you submit your literature review and the feedback will indicate that your literature review is:

- Accepted as is,
- Accepted with minor modifications, or
- Accepted with major modifications.
- Not accepted

You will have two weeks to make revisions, if needed. Because the literature review is equivalent to the doctoral written exam, students can receive a “not accepted” evaluation

only two times. If the student's second literature review is not acceptable, the student will fail the written exam and will become academically ineligible to continue in the doctoral program.

Please note that it is important that the literature review is your own work. Copying and pasting text from the literature is plagiarism and is NOT acceptable. Please visit <https://writingcenter.unc.edu/tips-and-tools/plagiarism/> for plagiarism guidelines.

Timing

The literature review is due August 15, prior to beginning your second year in the graduate program. We recommend that you work on your literature review over the summer, beginning once you finish your spring semester classes in your first year.

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/>