

FGSR Professional Development Student Life Module



Writing a Scientific Paper

Graduate students in the sciences will often publish scientific papers in conference proceedings and/or journals. A good paper can take a long time to write and will stand for all time. A great paper may launch your career, and regardless of where you go, publications are an important contribution to your CV. Before graduate studies you likely did not write a first authored paper to be submitted for peer review. Below are some points to consider when you are faced with writing a scientific paper.

Tips

1. Before you Begin Writing

- Consider authorship and who will be part of your paper and the contributions they have made to the research.
- When deciding on a journal, consider prestige (impact factor), access, and appropriateness. Review the aims and scope of the journal. Review journals you cite for ideas of possible journals for submission.
- Find journals to suit your target audience. Discuss the choice of a journal with your supervisor.
- Make a decision on the choice of journal to submit your manuscript. This allows the paper to be geared to the appropriate audience and journal requirements. Write according to the objectives of the journal and their audience. Some journals indicate their typical audience under “Information for Authors.”
- When deciding on a journal it is important to consider prestige (impact factor), access, and appropriateness. Review the aims and scope of the journal. Review journals you cite for ideas of possible journals for submission.
- Once you have chosen a journal to submit your paper for publication, read the “Information for Authors” section and follow instructions given to authors.

2. Title

- Give your article a title that will capture your topic and adequately describe your research.
- Decide the message you want to get across and which results support your message.
- Choose key words that others will likely use as search words.
- Avoid abbreviations in the title.

3. Abstract

- The abstract should be a self contained summary of the research.
- Include the central question or purpose of the study.
- Give a brief introduction to the topic and knowledge of the field.

- Provide a brief summary on what was done (your methodology), the results and a general conclusion. This is not the place to refer to tables and figures in the paper.
- You do not have to include all of your results. You want to entice readers to read the rest of your article or poster to find out the details and your exciting results.
- An abstract should not contain any information that is not stated in the paper.

4. Introduction

- Provide sufficient background information for non experts to understand the relevance of your work and put your work in context of previous research.
- State rationale for the study and why it is important to the reader.
- Often researchers use the introduction to pose questions to the reader as a means to orient the reader. This clarifies to the reader what you will do and why you are doing this research.
- Clearly state your hypothesis and objectives.

5. Materials and Methods

- Details and accuracy are important in this section of the manuscript to allow repeatability. Can someone else follow your instructions?
- Most of this section of the paper should be written in past tense.
- Materials should include specification, quantities and source. It is common to use the generic or chemical names of materials instead of trade names.
- If your methods are unpublished, you will need to provide all required details. If the method has been published previously, a literature reference should be given.

6. Results

- Present analyzed data in this section. State the results simply and clearly.
- The results section should do two things; 1) include a description of experiments to provide information on the big picture and 2) present your data.
- Prepare the figures and tables before you write.
- Present the data in the text or table or a figure. Do not present the same results in more than one way.
- Present representative data instead of repeating similar results.
- Write legends for tables and figures to interpret your results.
- You do not have to highlight all of your results however; you can use your findings to show trends and key points.
- Results should be written in past tense.

7. Discussion

- In the discussion, you aim to discuss not repeat the results.
- Present your interpretation of the analyzed data in the results section. Explain the meaning of your results in context with previous research.
- Types of questions to consider for the discussion: Were your results what you expected? Did your experiment prove or disprove your hypothesis? What did you learn from your analysis? How does your research relate to the field? What kinds of conclusions can you draw from your results?
- Assume nothing, explain everything. Review the extent of explanation with your supervisor.
- Do not overstate conclusions in the discussion section. Do not assume that your study will be ground breaking.
- Ask your supervisor and other knowledgeable people for feedback on your paper before submission for publication.
- Point out exceptions, lack of correlation, and define unsettled points. Do not try to cover up data that do not quite fit. Indicate how your results agree or disagree with previous work.
- Discuss implications of your work.
- Clearly state your conclusions.
- The introduction section should have introduced the question and the discussion section should interpret how your results help to answer the question.

8. Acknowledgements

- This section includes any significant technical help you received from any person (source of equipment and other materials).
- Financial assistance such as grants, contracts or fellowships should be recognized.
- Be courteous when preparing the acknowledgement section. However, obtain permission from others before adding them to the manuscript. If you want, you can show your collaborator the wording you have used in your acknowledgement section and ask if they approve.

9. References

- Reference only relevant published references.
- Check your references for accuracy by comparing to the original publication.
- Check that all cited references in the text are listed under the literature cited section.
- Learn how to use citation software such as EndNote or RefWorks to help with referencing and bibliography style.

10. Submitting the Manuscript

- Review instructions to authors to ensure you have followed all instructions.
- Make sure to proofread your final draft and ask a colleague to proofread for you as well.

- Follow instruction for electronic or conventional submission. Carefully package your manuscript if sending by mail.
 - Make sure to write a cover letter when submitting your manuscript.
-

Activities to Do On Your Own

- Enroll in a course on writing on campus to improve your skills. Check the Faculty of Extension for writing courses currently offered.
 - Start writing something you are working on and get feedback on your style and content. Ask for feedback from colleagues, supervisors and classmates.
 - Attend sessions offered by the Academic Support Centre:
<http://www.uofaweb.ualberta.ca/academicsupport/index.cfm>
-

Other Resources

- “Your First ‘First-Author’ Paper: part one.” By Phil Dee. Science Careers February 15, 2002.
- “Your First ‘First-Author’ Paper: part two.” By Phil Dee. Science Careers March 15, 2002.
- “How not to kill a grant application: part 6.” By Vid Mohan-Ram. Science Careers August 11, 2000.
- Mastering Your PhD Gosling and Noordam, (2006) Springer. Chapter 12: From Data to Manuscript.
- Building a Successful Career in Scientific Research By Phil Dee, (2006) Cambridge. Chapter 6: Writing papers and abstracts.
- How to Write and Publish a Scientific Paper By Robert Day, (1994) Cambridge, Pheonix, AZ, Oryx Press.
- venvoorden. Toastmaster, Dec 2007: 26.