Guidelines for writing the Introductory section of a PhD thesis at NMBU/BIOVIT

approved 04.12.2019/ updated 2.09.2020

The "Regulations for the degree of Philosophiae Doctor (PhD) degree at the Norwegian University of Life Sciences" (last revised 2020) briefly describes the requirements for the PhD thesis in Section 10.1. Point (3) mentions the Introductory section:

> (3) The thesis may consist of a monograph or a compilation of several pieces of work in the form of scholarly manuscripts and/or articles. *If the thesis consists of several part-works, the thesis must contain an introductory chapter ('kappe') which from an overall perspective, summarises and collates the research questions and conclusions presented in them. The PhD candidate must be the sole author of this introductory chapter.*

This document provides guidelines on how to write the Introductory section or synopsis (Norw.: *kappen*). See NMBUs general guidelines on finalizing your PhD work. If you are not familiar with scientific writing, or need better skills, please consult NMBUs Writing Center. Many points in these guidelines are inspired by related documents from LANDSAM (2014) and MINA (2018).

Length of the Introductory section

In our sciences the Introductory section is usually about 25-70 pages. The exact page number is not important, as this may naturally vary between scientific disciplines, but you must include all main parts of the thesis presented in the section below. The evaluation committee puts weight on the *quality* of the scientific content and discussion of the Introduction, but they may object if the Introduction is too short or too narrow in scope. If your scientific work and papers are close to the lower limit of requirements for a PhD thesis, you could include a more detailed presentation and discussion in the Introduction, with text that is not covered in the papers.

Table of content

The detailed Table of contents of the Introductory section may vary between scientific disciplines and also between theses within a discipline. It can consist of 2-3 hierarchical levels for better overview of its scientific content. Number the sections like this: 1., 1.1, 1.1.1, 2. etc. Do *not* write 1.0 and 2.0 for the main chapters as this is illogical (1.0 and 1.1 would be on the same hierarchical level).

Here is a general example of the main chapters and sub-chapters, with some explanations. We recommend that the list of main chapters is used in the thesis. Check a few recent PhD theses within your scientific discipline at BIOVIT to get tips on the outline. Discuss the outline of your Introduction with your main supervisor. In the Table of content, give page numbers to the first page for each section.

Preface and acknowledgements	Or only 'Preface' or Acknowledgements'. This is not a formal part of the thesis and is not evaluated by the committee.
Table of content	

Summary	English summary, about 1-2 pages. This is like an overall abstract for the whole thesis.
Sammendrag	Norwegian summary, exact translation of the English.
List of papers	
1. Introduction	
1.1 General introduction	Present the main topic of the thesis, general scientific questions you address, and if relevant challenges in the animal or plant production or industry that you will contribute to solving by your research.
1.2 Background 1.3 Status of knowledge	Here you may present more details than space in your papers allow. You must give the background for your research, present the state of knowledge within your field of work and point on knowledge gaps you will contribute to filling, and present and explain relevant theories that you use as your basis or will explore. Give an overall presentation of your research topics, not only the background for each paper. Chapters 1.2 and 1.3 can be specified as you wish, and a third hierarchical level (e.g. 1.2.1) may be used.
1.4 Objectives and aims	General objectives, aims and part aims must be detailed and explained, including hypotheses and predictions.
2. Material and methods	The methods and the material must be presented in sufficient detail so the reader can understand the following results and discussion. Include methodological approach, research material, research design, and statistical analyses in brief. Use photos to elucidate your material and methods if relevant. If the methods are presented in sufficient detail in the papers, you do not need to include all details here.
3. Results	The results chapter can be organized in various ways. If the individual papers present quite different research approaches, this Results section can be organized with sub-chapters for each paper. Alternatively, it can be organized according to scientific topics, partly across papers. You should not include all your results in detail, but focus on the most important results that relate directly to your research questions and hypotheses.
4. Discussion 4.1 xxxxxx	The Discussion should be organized into relevant sub-chapters. You should start with summing up your main findings. Then you must discuss all main results in relation to previous research and relevant theories, and you synthesize your findings across individual papers. Discuss to which extent your results answer to your research questions and fit with the hypotheses and predictions. Pull together all threads and give an overall, integrated discussion of how your results answer to your main objectives. If relevant, you may modify conclusions presented in your first papers, e.g. based on results in later papers.

	Put your results into a more general scientific context. See if you can adjust generalizations from previous literature so the scientific knowledge becomes more specific. Discuss limitations in your methods and statistical analyses and explain how methods could be improved.
4.2 Future perspectives	Present ideas for future research based on your results. You may speculate, as long as you present it as speculations which could be explored.
5. Conclusions	Present all of your conclusions from the different papers and across papers, related to your objectives, aims and hypotheses, and describe your contribution to scientific knowledge within your field. This section should not be too long, half a page or so. Do not present speculations here, but you may point to knowledge gaps that are not yet filled.
6. References	A reference list according to a chosen standard of all published literature that you cite in your Introductory section. You do not need to include all references from your papers.
7. Papers	Include all of your scientific papers in full-text. Remember to check for copyright issues with the journals. You should be allowed to print your own articles in your PhD thesis. See information about this here.
Appendix	You may choose to include appendices with raw data or more detailed analyses that are not part of the papers, while interview guides or questionnaires should be included in Appendix. If your data are too big to be included in paper, you may add an exact link to a website where it is found. Material in Appendix may be useful for the committee and for other readers. Several appendices should be numbered to ease citations in the text.

Reasons for rejection of a PhD thesis

Now and then a submitted thesis may be judged to be insufficient in its present form and asked to be revised within three months (cfr. PhD regulations, Section 15.2 (2), alternative b). In very rare cases, a thesis can be completely refused (alternative c). Below is a list of reasons used for such judgements. If several of these problems occur in a particular thesis, the chance increases that it can be judged according to alternatives b or c. Be careful to avoid such criticisms in your thesis. Your supervisor should read through your Introduction before you finalize your thesis, but you are the responsible author for the Introduction. The supervisor can give general feedback but note write any of the text.

List of severe criticisms

- Inferences from the data were actually not supported by the papers and data therein.
- Synopsis found to be too brief on methods and results and the discussion repetitive.
- The synopsis lacked balance and overview in putting problems/objectives in perspective.
- The discussion is merely a summary of the research papers and not any integrated analysis.
- A view on the applicability of what was tested was lacking.

- Lacking in both width and depth.
- Lacking proper statistical analyses.
- Overall sloppiness in internal cross-referencing, literature coverage and citation, as well as unprecise use of terms.
- Inconsistent and apparently random use of terminology and concepts.
- Omission of an important body of literature.
- Serious methodological concerns: lack of appropriate controls.

In addition to this list, be careful to avoid poor English language, several spelling errors, errors in the references, wrong numbering of figures and tables, or general sloppiness, as this may add to a negative evaluation.