Guidelines thesis preparation

May 2022

Thesis components

Title page [Titelseite]
According to the guidelines of the examination office:
https://tu-dresden.de/bu/umwelt/forst/studium/Formulare

Acknowledgments [Danksagung] – optional
In the acknowledgments, one may thank those that contributed to the realization of the thesis (e.g. collection of materials, data analysis, editorial help, emotional support). The acknowledgments may also be placed after the abstract, or at the end of the thesis.

Abstract [Zusammenfassung] – in both English and German
A summary should convincingly convey: (i) why you conducted the study, e.g. relevance of the topic (introduction + context), (ii) how you conducted it (methods), (iii) what you found (results), and (iv) which implications your study has (conclusion + outlook).

Table of contents [Inhaltsverzeichnis]
A list of chapter and section titles and their commencing page numbers.
If applicable, the table of contents is followed by a:

- List of Tables [Tabellenverzeichnis]
- List of Figures [Abbildungsverzeichnis]
- List of Abbreviations [Abkürzungsverzeichnis]

1 Introduction [Einleitung]
In the introduction, the thesis topic is literally introduced. It presents state of the art knowledge based on scientific literature, identifies a knowledge gap that will be addressed, thereby setting the frame for the thesis' research questions and hypotheses. An introduction should have the character of a review, and convincingly answer questions such as: why is the topic of your thesis timely and relevant, what are key questions in the respective research field, and what new insights may your thesis add towards answering these questions? Introductions of empirical studies, i.e. research based on observations and (or) measurements, should be concluded with a series of research hypotheses. Research hypotheses are testable expectations; they need to be formulated as precise as possible, i.e. do not state "I expect a difference in growth between species A and B", but "I expect species A to grow more than species B". Hypotheses should logically follow from the information presented in the introduction. In literature studies, usually no hypotheses are formulated. Instead, the main questions that will be addressed in the literature review are presented.

All studies used in writing your introduction as well as the rest of your thesis should be acknowledged accordingly. For more information on how to cite literature, consult the devoted section 'Citing' later in these Guidelines. When citing a study, focus on the specific findings of that study, not on the authors! So rather than: "Max Mustermann (2012) showed that European beech is a drought-sensitive tree species", write: "European beech is a drought-sensitive tree species (Mustermann, 2012)". Only in exceptional cases, it may be effective to put author names as subject of a sentence.

2 Materials and methods [Material und Methoden]

This chapter contains a description of the study area, fieldwork (e.g. extraction of increment cores, vegetation survey), sample preparation, measurements, and -at the very end- a description on the statistical analyses that were applied. Sufficient detail is needed to make the work reproducible. When using existing methods, referring to relevant papers describing the methodology suffices.

The Materials and methods section is a central element of any scientific work, given that it helps readers to interpret and assess the validity of the results presented therein. It is usually written in simple past (Vergangenheitsform).

3 Results [Ergebnisse]

The chapter concisely presents those results that are relevant to answer your research questions, and does so in an objective way. The results should be described in the text and supported by figures and tables, but without any interpretation. The latter is done in the Discussion!

When describing results, refer to relevant figures and tables in brackets at the end of the sentence; do not use figures or tables as subject of a sentence! For example, write: "Species A grew more than species B (Fig. 1)" instead of "Figure 1 shows that …". Similarly, never use statistical tests as subject of a sentence (e.g. "An ANOVA showed significant differences between A and B"). Statistical tests are merely supporting your findings, it are no findings themselves! Relevant details on statistical tests are, however, commonly reported between brackets after a sentence highlighting a particular finding, e.g. "The volume growth of beech in the period 2000-2020 was 40% higher than that of oak (t-test: t = -2.66, p = 0.021; Figure 1)".

The hypotheses presented in the Introduction may be used to structure the Results chapter. For each hypothesis, ideally one effective figure is presented. Do not present redundant data or the same data twice, e.g. in tables and figures.

Given that your analyses and (or) experiments were completed before writing the Results, the simple past tense is the most natural choice when describing your results.

4 Discussion [Diskussion]

This chapter contains the interpretation of the results based on information from inter-/national scientific publications. Thereby, results are compared with those from other studies and potential reasons for discrepancies are discussed. New insights should be

highlighted. The last paragraph of the discussion (or even a separate chapter) contains main conclusions as well as an outlook. More specifically, one should summarize key findings and describe which implications the study results have. When making suggestions for future research, be specific! For example, do not state: "More research is needed." as such a suggestion is meaningless and does not help to advance science.
As in the Results chapter, it is advisable to structure your discussion according to your hypotheses. Discuss whether your findings support or contradict your initial hypotheses, as well as how they relate to findings published by others.
After discussing your findings and prior to presenting your conclusions + outlook, it is advisable to add a paragraph discussing problems of methodological nature (e.g. with regard to the research design, the performed measurements, or statistical analyses). It is important to write your methodological discussion in a constructive manner: what can one still learn from your study despite the methodological challenges mentioned?

Reference list [Literaturverzeichnis]
A reference list is a detailed list of publications cited in the thesis. See “Citing” for more information about formatting reference lists. Make sure that your reference list as well as your in-text citations are uniformly formatted!

Appendix [Anhang] – optional
Supplementary material (e.g. figures, tables) or details on the methodology that might be relevant for a reader, but would distract when included in the main text, can be presented in an appendix.

Thesis format

Layout
For readability, it is best to use fonts with serifs (e.g. Times New Roman, Garamond), in 12-point size (in tables / figures eventually smaller). Text should be justified [Blocksatz].

Figures and tables
Figures get explanatory captions below the figure, tables get them above. Captions contain concise descriptions of what is shown, and if applicable, explain abbreviations or symbols used. Together with the caption, figures and tables should be self-explanatory.

Typesetting
Parameters, equations and scientific names (genera and species names – not author names and additional information like spp.) are generally provided in italics (e.g. *Pinus sylvestris* L., *Picea abies* (L.) Karst., *Quercus* spp.).

Citing

When using information from published literature and (or) other sources (or software like R / RStudio and specific R packages), this has to be cited correctly. If not, one is claiming authorship; falsely claiming authorship is called plagiarism.
When using the exact same wording as in a source, text should be placed within quotation marks. However, instead of quoting, it is better to paraphrase the information. Further, it is not allowed to take argumentation lines from other publications without properly citing them. Generally, sources should be used that meet scientific standards.

Citation style

Many different citation styles exist, both for in-text citations and reference lists. The most common way of referencing, which is also the recommended style for in-text references in a thesis, is the author-date style:

One author (Author year) or (Author, year)
Two authors (Author1 & Author2 year) or (Author1 & Author2, year)
(Author1 and Author2 year) or (Author1 and Author2, year)
More authors (Author1 et al. year) or (Author 1 et al., year) > Latin: *et alii* = and others

In case of citing two (or more) publications from the same author and year, use lower case letters after the year: (Doe, 2015a) and (Doe, 2015b), to distinguish between individual papers.

If more than one reference is referred to, references are ordered chronologically and (or) alphabetically (depending on the style), separated by comma's or semicolon's:

- (Doe 2011, Doe 2013)
- (Doe, 2011; Doe, 2013)

When citing textbooks, it is recommended to provide the exact page numbers where the information was found, e.g.: (Doe, 2013: p. 20) or (Doe, 2013: pp. 20-28).

At the end of the thesis, a reference list is provided that contains all sources that are cited in the text. The sorting of references occurs alphabetically by the first author, and, if the first author is identical, by a possible second author or by publication year.

Common citation styles in reference lists for:

- **Papers in scientific journals**
  Author(s) / publication year / title / journal / volume / pages
  Schweingruber FH, Eckstein D, Serre-Bachet F, Bräker OU (1990). Identification, presentation and interpretation of event years and pointer years in dendrochronology. Dendrochronologia, 8: 9-38.

- **Books**
  Author(s) (if applicable add "(Eds.)" for edited books) / publication year / title / publisher / place of publishing
  Fritts HC (1976). Tree rings and climate. Academic Press, London.
- **Chapters in edited books**
  Author(s) / publication year / title of the chapter / title of the book / editor(s) / volume (if applicable) / publisher / place of publishing / page range
  Fritts HC, Guiot J, Gordon GA, Schweingruber F (1990). Methods of calibration, verification, and reconstruction. In: Cook ER and Kairiukstis LA (Eds.). Methods of dendrochronology: applications in the environmental sciences. Kluwer, Dordrecht, pp. 163-217.

Citation styles differ e.g. in separators between different elements, in punctuation, as well as in the element order. Compare, for example, the styles of the following journals:

- **Dendrochronologia**
  Schweingruber, F.H., Eckstein, D., Serre-Bachet, F., Bräker, O.U. 1990. Identification, presentation and interpretation of event years and pointer years in dendrochronology. Dendrochronologia 8, 9-38.
- **Climatic Change**
  Schweingruber FH, Eckstein D, Serre-Bachet F, Bräker OU (1990) Identification, presentation and interpretation of event years and pointer years in dendrochronology. Dendrochronologia 8: 9-38.
- **Nature**
  1. Schweingruber, F.H. *et al.* Identification, presentation and interpretation of event years and pointer years in dendrochronology. Dendrochronologia 8, 9-38 (1990).

It is important to select a specific style and consistently use this style throughout the reference list! Citation software may support here (see below).

Citation software

As many journal publications and other sources will be gathered during thesis preparation and writing, the use of reference management software is recommended. Besides proprietary software like "CITAVI" or "Endnote", free and open source alternatives like "Mendeley" or "Zotero" can be used (for an overview of software see: https://en.wikipedia.org/wiki/Comparison_of_reference_management_software).

Citation software creates a database with information on the collected literature (authors, titles, journals, page numbers, etc.) and can be used to cite literature within a word processor (e.g. MS Word, Libre Office). An advantage of citation software is that the citation style can be changed throughout the whole thesis at any moment, and it automatically creates a reference list at the end of the document.

Manuscript-based thesis

The Chair of Forest Growth and Woody Biomass Production also welcomes manuscript-based theses, i.e. theses presented as a manuscript to be submitted to a scientific journal. The manuscript should be formatted according to the requirements described under “Thesis components”, and will be examined as a traditional thesis. Manuscript-based theses are the preferred choice for those that intent to pursue a career in academia after their Masters.

Colloquium

Length

Students are expected to finish their thesis with a public colloquium about their work. The colloquium consists of a presentation by the student:

- Bachelor: approx. 20 minutes
- Master: approx. 25 minutes

followed by questions from the audience and a discussion (maximum total duration of the colloquium is 45 minutes for Bachelor / 60 minutes for Master students).

Outline

A colloquium gives the opportunity to share your research with others. Although one may base its’ outline on the thesis outline as described before, also other and probably more appealing presentation outlines are possible. Please be creative, and consult websites such as: https://www.elsevier.com/connect/how-to-give-a-dynamic-scientific-presentation. Results and discussion are usually mixed in presentations.
Since the audience may not be familiar with the topic, slang or assumptions should be avoided. Further, presenting only a selection of results (and related scientific background, materials and methods) might be necessary, as time is limited. Take care that transitions between slides are smooth (i.e. there should be a clear storyline). Practicing the presentation beforehand can be helpful.

Presentation format

Some suggestions:

- Do not excessively use pictures to make slides more colorful, it might distract from the content.
- Slides should only contain key words or short phrases, not full sentences.
- Use 20 point-size minimum, better >26 point-size, and font types without serifs (e.g. Arial, Helvetica) as such font types are also well readable from a distance.
- Present key figures of the research (figures are preferred over tables) that can be easily understood. Do not use red-green contrasts, as colorblind people will not be able to distinguish differences.
- References can be placed in a reference list at the end of the presentation, or at the bottom of individual slides. The reference list is only shown upon request!

Questions and discussion

In preparing the discussion, try to think of possible questions and include additional slides at the end of your presentation to answer them.

Last but not least: Don't forget that you are the expert!