How to Write a Thesis

1 Registration Procedure

- Fill out the correct registration form from the examination office at
  `http://portal.uni-freiburg.de/pa-vwl`.

- Hand the form into the examination office, since the form needs to be stamped by the examination office *before* you hand it to your supervisor.

- Your countdown until submission starts only once your supervisor has entered your topic. Please consult the examination office for details.

- Please read through the official guidelines! B. Sc. and M. Sc. VWL students can find them on the homepage of the examination office; M. Sc. Economics students can find them on the program's homepage.

- Only the examination office can give you definite/official answers regarding registration procedural steps.

2 General Information

- If you choose LaTeX instead of Microsoft Word, you can find numerous tutorials online. As a LaTeX distribution, we recommend the installation of MikTeX (`http://miktex.org`, Windows only) first and then TeXnicCenter (`http://texniccenter.org`) as an editor.

- When using LaTeX, we recommend the use of the chair's template in order to align with formal requirements regarding the layout.

- English is – generally speaking – the preferred language of your thesis to increase scientific value.

- If you are writing a Bachelor's or "VWL"-Master's Thesis in English, you have to add a German "Zusammenfassung" according to the examination rules.

- Keep the page limit in mind
  a) Your Bachelor's thesis should not exceed 30 pages.
  b) Your Master's thesis should not exceed 35 pages.
  c) Exceptions are possible on request; align decision with your supervisor.

- You must submit your thesis according to the deadline. You have to hand in 2 hard copies and one digital copy of your thesis (refer to the examination office for latest changes). If you write an empirical thesis you should also hand in your data and code.

- The correct English name is not *Bachelor thesis* or *Master thesis*, but *Bachelor's thesis* or *Master's thesis*!

3 Citations

- Please be careful to cite correctly otherwise it will be regarded as plagiarism (`http://en.wikipedia.org/wiki/Plagiarism`)! Plagiarism will result in failing.

- There is a difference between *direct quotations*, *citing an approach or similar directly* and *indirect quotations*. Make sure you understand the differences.

- This is an example of a direct quotation

    This is contrary to the conventional perception that "large data sets offer a higher form of intelligence and knowledge" *and possess an* "aura of truth, objectivity, and accuracy" *(***Boyd.2012***)*.

- Example of citing an approach or similar directly

    F*ollowing* **Conejo.2005** *and* **Misiorek.2006***, we employ a naïve but challenging test to verify that our proposed models are better than random guessing.*

- Example for an indirect quotation (analogous statement)

    *These are robust to errors resulting from the inclusion of predictors that do not contribute to the model by performing feature selection (***Kuhn.2013***)*.

- As a general recommendation, don't use direct quotations frequently, only if you want to quote one of the "big guys" or unique statements.

- When citing websites, add the date at which you retrieved the content.

- Be consistent with your citation style and your bibliography.

4 Literature

There are many sources of literature for your thesis. A good starting point are those listed below.

- Google Scholar

- Web of Knowledge

- ScienceDirect

- Webpages of journals, such as Elsevier, Springer, IEEE and ACM

You may want to use different literature depending on the reason for your reference. Below you can find a list of reasons why one would use a reference:

- Similar research

- Proof of relevance

- Proof of novelty

- Same methodology

- Links for background search

- Theories for discussion

During your research, you will presumably collect quite a large number of publications. The proper organization of your literature will therefore ease your writing and citing later on. We recommend you use software which to help you with the organization, such as Citavi (you can get a licence through the university). Citavi works well together with both LaTeX and Microsoft Word. If you prefer to write in Microsoft Word, you can also consider the use of its internal reference management (search for a tutorial online).

5 Writing your Thesis

When it comes to writing your thesis, we expect a scientific style, structure and form which is described below. Allow yourself enough time for the actual writing process and revising, since writing is not a trivial task!

5.1 Style

- Check your spelling and grammar.

- Use understandable/clean English. You might want to check for synonyms using e. g. `http://thesaurus.com`. Another good dictionary is `http://www.ldoceonline.com`, which provides examples on how to use words in the right context.

- The way you write strongly affects how your text is interpreted. Therefore, we recommend you read *"The Science of Writing"* by George Gopen (`http://www.docstyles.com/library/ascience.pdf`) carefully and to follow all suggestions closely.

- Read `http://www.docstyles.com/library/ascience.pdf` on how you can help readers by adding commas. Here is a rather short summary, i. e. `http://englishplus.com/grammar/00000074.htm`. In addition, we recommend that adverbs at the beginning of a sentence are followed by a comma, e. g. *"Interestingly, this helps readers to understand your writing"*.

- Within your document, we recommend that each section is introduced by at least a few sentences. By doing so, you avoid situations where two headlines are immediately followed by one other. Instead, add a separating sentence that introduces the topic and its context.

- Format your R code using a monospaced font which helps readers to identify text as code. See `http://en.wikipedia.org/wiki/Monospaced_font` for an explanation. In addition to that, you might want to use a different colour scheme.

- In most cases, a footnote at the end of a sentence follows the punctuation, as this example shows.[1]

- Check the number of decimal places. A number such as 1.23456 might be correct, but given possible perturbations and errors of the original data, it is common to restrict oneself to roughly one to three decimal places (e. g. 1.23). This is achieved by rounding before copying R output into your document.

- Use capitalization in your headlines consistently. Either **always** use initial capital letters, such as *"Table of Contents"*, or **always** an initial capital letter followed by small ones, such as *"Table of contents"*.

5.2 Structure

As a sample structure, we recommend a general layout of your thesis. Please keep in mind that you need to adapt this to your specific setting.

Abstract

- A short summary of your topic in a nutshell. Should be not more than 150 words as a single paragraph without any references. First, describe the motivation for your topic and then name the methodology, summarize the outcome and give quantitative results.

- The abstract is not mandatory for a thesis, however writing an abstract will help you to set a straight focus!

Zusammenfassung

- Summary in German!

- Only if required by the examination rules.

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[1] This is a footnote

Introduction

- What is the overall problem you are addressing?

- For whom is this a problem?

- What consequences are stemming from this problem?

- Where is the research gap?

- What is your objective for this resarch?

- What is your contribution?
    - Methodological contribution?
    - Practical contribution?

- What are you going to do in this paper exactly?

- How are the following sections structured?

Background / Related Work

- Literature overview: Who has addressed this issue before?

- How did they do it?

- This is the line of argumentation for the research gap you are trying to fill!

- You need a solid body of papers from established journals.

- Summarize the findings and identify differences to your own study.

Methodology

- Provide an overview of the research process!

- Which established methods are applicable to solve your problem?

- How are they applicable to solve your problem?

- To find the right methodology, take a thorough look at the literature.

- How does your approach relate to the reviewed literature?

Results

- What are the findings?

- Find appropriate visualization (e. g. tables, charts).

Discussion

- How do the results relate to the overall research?

- Point out managerial / policy implications and future impact?

- Did you expect these results?

- What are the limitations of your approach?

Conclusion

- Recap: What was the research question?

- What did you do in this paper?

- How did you do it?

- What were the results?

- What are the implications (for science, business, policy...)?

- What are the limitations of this work?

- What are you proposing for future research?

Appendices

- Additional information, such as charts and tables.

- Only if really necessary!

5.3 Figures and Tables

- Check your captions beneath figures. Make sure the text starts with a capital letter and the sentence is accompanied by punctuation. Correct examples are:

    Fig. 1. Some text.

    Figure 2. Some other text.

- Each figure and table must be referenced with a number in the text. Most authors spell *"Figure 1", "Table 2", "Equation (3)"* and *"Section 4.1"* with a capital letter when accompanied by a number.

- Highlight column names (i. e. the first row of your table) in bold.

- You should not copy output of the analysis of linear regressions from R as graphics, but add a table of your own by selecting the most relevant values (e. g. t-values, estimates or standard errors).

- Pay attention to the quality of your graphics. Make sure you use a high resolution so that graphics are not pixelated. If you make your own graphics, we recommend Microsoft Visio for procedural/flow diagrams.

5.4 Formulae

- Formulae are always followed by a punctuation, e. g.

$$2 + 2 = 4. \tag{1}$$

At the same time, you do not use a colon before a formula.

- If you write with Microsoft Word, use the built-in formula editor in Word. Do not copy formulae as graphics with different layouts or of low quality. Also use the formula editor inside Word for in-text formulae or symbols, such as $a + b$, to typeset variables in italics. Try to use a recent version (2007 or later), since it comes with a new editor for typesetting formulae.

- Explain all the variables (especially in formulae) you use. For example, $F = mg$, where F is force, m mass and g the gravitational constant.

- Variables must be in italic, such as x instead of x.

- Longer equations should be placed in a separate line – either aligned to the left or centred. Also consider using equation numbers.

- Use your variable names coherently, e. g. a variable e cannot be used as an error term and then as a time series.

6 Grading

The grade for your thesis depends upon:

- **methodological rigor:** How adequate is your method to solve the given problem? To which degree does your method represent the state of the art?

- **scientific rigor:** Did you provide an exhaustive overview of related work? How well did you manage to embed your thesis into existing literature in the field? How well did you outline the research gap? What is the level of abstraction and generalization? (e.g. did you just rephrase existing literature or did you integrate your own thoughts? did you provide references to related problems?) Did you clearly explain the limitations of your work?

- **scope:** To which degree did you solve the problem? Did you check the results for robustness regarding different scenarios or parameter settings?

- **structure:** Is the overall structure comprehensible? Does it fit to the content? Do the paragraphs and sentences make clear points?

- **language and form:** Is the language simple and comprehensible? Is the spelling flawless? Do the plots provide a clear message? Does the formatting follow the guidelines?

- **collaboration:** How effectively did you collaborate with your supervisor?

Overall, we put superordinate weight on methodological and scientific rigor. Yet, please do not neglect the other criteria.