GUIDELINES FOR WRITING
SMT MASTER THESES
Version V1.2 2023[1]

The purpose of this guideline is to give you some hints and tips about writing your master thesis. The guideline does not intend to be comprehensive. However, some theses have received low marks because their authors made mistakes that are entirely avoidable. This guideline aims to give you the main keys to avoid this. Please note however that this document does not replace or alter the official guidelines of EPFL or specific requirements of your academic supervisor. It is meant to be an additional guideline geared towards writing a good thesis in the SMT Program.

1. General

When you write your master thesis, please have in mind the "informed reader" who is familiar with standard methods and has reasonable background knowledge in the domain of your studies. As a guideline, you can assume knowledge of standard textbooks you have used in your coursework. Equivalently, assume the typical knowledge of one of your classmates. On the other hand, you should discuss methods that are idiosyncratic, e. g., methods you did not know previously but were used by employees of the company where you are doing your internship or your academic supervisor. The whole thesis should read as one self-contained piece and should be accessible.[2]

2. Structure

You should spend a significant amount of time thinking about how you want to organize the content of your thesis. Ask yourself what belongs together and which parts naturally relate to each other. Weak master theses typically try to just organize the material into subheadings and then lose sight of the relationships between different parts of the thesis. Also, if related discussions appear in separate parts of the thesis, then this is often a sign for poor structure.

---

[1] This version was reviewed and adapted to the SMT Program needs by Quentin Gallea, Veronica Petrencu and Samuel Wicki.

[2] If you need an additional reference on how to write your thesis, you can refer for instance to **The Little Book of Research Writing**, by Varanya Chaubey.

Structure follows content, not the other way around! In particular, do not aim for a detailed table of contents and then proceed to fill little boxes. Rather, write a thesis with a clear logical structure. As you revise your argument, you will probably also want to change the way you arrange your argument into sections and subsections. Generally, avoid a structure with many section headings and an elaborate hierarchy of subsections. On the other hand, having more than five pages without a (sub)section heading will make the text inaccessible and difficult to read.

2.1 Executive summary usually takes half a page and is written on the first page of the thesis. This summary might also be required by the EPFL academic services and E4S for a repository of master theses. The term executive means that it is written for people who might want to use the results you obtained. It is written in a short and crispy way and goes rapidly to the point.

2.2 The introduction should typically be in the 2-4 pages range and should tell the reader about the main topic and findings of your thesis (hence, **write it at the end!**). Do not try to just give a long summary. The reader needs to know what to expect and where to find it in your document. Do not try to write a thriller where the plot is kept secret until the end. It is much easier to read a long document when you already know what the punchline is.

The introduction is the chapter that informs the reader what he is about to read. If you look at good academic papers, you see that introductions are often structured as follows : background information (societal relevance and scientific relevance), literature review, the purpose of the paper and what it brings new (research question), how the paper answers this question (methodology), a glimpse into the results, and a short insight into the main conclusion. You could write around one paragraph for each of these elements. The introduction is thus similar to a short plan of the paper explaining its structure and informing the reader what he finds where.

2.3 Background information. Whether you write a technical thesis, a case study or describe your assignment within the company, you probably need a chapter in the beginning where you provide the reader with the required background information. This should not be an opportunity to fill many pages with everything you know. The purpose is not to entertain the reader. However, everything that is required to understand the argument and the points you are trying to make should be here. Typically in research papers this part contains historical context. In some theses, the background is partially in the introduction, and partially in the literature review. Some have separate chapters. Keep the “informed reader” in mind to know how deep to go.

2.4 Related literature / theoretical background. Your master thesis should contain a literature review / theoretical background that puts your thesis into perspective. Even if you write about the work you carried out in a company, you need to show that you have read the relevant literature. It’s unlikely that you are the first person writing something about this topic. Remember Newton’s famous metaphor “Standing on the shoulder of giants”. Who are the giants (key authors of your field) on whose shoulders you stand, and who are the less famous predecessors who also wrote about it ? This part of the thesis should be about **30% of your overall document**.

The contribution of your literature review comes from the structure you generate and the links between the articles and books that you survey. The worst type of literature review is a long sequence of unstructured summary of the type "he said this, they said that." The reader does not learn anything from that and simply gives up.

Your professor may give you some articles to get started with (they usually know the giants of your field), after this you have to research the literature yourself. Or start with the textbooks and articles that you have read in your courses. It is always a good idea to start with a survey article on the subject or a handbook article in order to get a grasp of the subject. But it is also important to go beyond overview articles and to find more specialized information that relates to your thesis subject. Keyword searches in specialized databases (google scholar) are useful for this. **Always check the validity of the article** (published in top journals, top scholar, aim for relatively recent work unless it's really a seminal paper, look at number of citations), for example by using elicit.org.

2.5 Methods & Analysis. Aim for a concise, in-depth depiction of your methodological approach (e.g., case study method) and the results of your analysis. In particular, do not just reproduce facts and figures. The difference between a mediocre thesis and a good or even an excellent thesis rests ultimately on **the quality of your original contribution**. It is easy to be overly impressed with glossy brochures, company websites, and annual reports that are provided to you by your thesis sponsor. However, **credit is given for your analysis.** You should see through these veils and show **independent and critical judgment.** Hence, while you read you should be alert to conflicts of interest and reporting biases that may influence the quality of your sources. It's in the methods part to explain what method you used to pierce through these veils. And it's by writing a short but good methods part that you're going to convince academics about the quality and robustness of your work.

The methodology is often structured in the following parts : first, explain your "research design". It can for instance be a "comparative case-study" of two companies handling their path to net zero in specific ways. Or, it could be a statistical analysis. You can also explain the steps you're taking. If you work with case studies, you should justify your case. How did you choose it and why is it interesting? Use for instance the case study guide by Yin (2014). Third, explain the data used and how you collected it. Did you work with interviews, semi-structured interviews, workshops, focus groups, participatory observations (of meetings, for instance), "gray literature", data sets, statistical information? That's the place where you give an overview of the data used. It's good practice to provide a table that gives an overview of this data and how many data points were used (e.g. 9 interviews, 2, focus groups, 3 data sets, and 92 documents). To conclude, The methodology section aims to show the reader what you did and how robust it is from a scientific perspective. The following four sections go deeper into specific aspects of the methodology.

2.5.1 Materials. You probably have access to some materials that are either not publicly available or at least not known to the hypothetical "knowledgeable reader." You want to **make your thesis self-contained**, so you need to cite these and give meaningful summaries (see "background information" above). Also, please make clear where you rely on materials available to you, and where your own analysis starts. Separate facts and comments.

2.5.2 Interviews. Some of you will carry out interviews with people at your company or elsewhere. What you learn from these people belongs to them; it's their opinion. You need to treat them like books : reference them. However, you reference humans differently than books. There are different ways of referencing information from interviews..

If your interviewee agree to be cited:

- indirect citation: *According to Mrs. Brown, CFO of CleanTechPro, the current industry brings us away from XYZ tech for a number of reasons.*
- direct citation: *Mrs Brown, CFO of CleanTechPro believes that "the future is in double decker electric buses".*

If interviewees do not wish to be cited, you could still talk about their opinion in the following way (*anonymous citation*): *The director of a leading technology in Western Switzerland believes that XYZ*. Here, you need to judge how precise you can be to prevent the identity of your interviewee to be revealed. Probably, a tech company dealing with electric buses in Western Switzerland is too precise. It might be easy to guess who it is. In this case, saying that it is a leading technology company in Switzerland, or in Europe would be safer.

Generally speaking, you need to explain to your interviewees what you're going to do with the verbal or written material they provide. The best practice is to go back to them later on and obtain their approval. This is especially important for direct citations. Asking for approval also allows you to do an "**expert validation**", which means that industry experts would have validated your analysis and hence increase your credibility. This is a very good practice and strongly increases the robustness of your work. The more sensitive the research topic and the data is, the more careful you need to be in the way you handle this confidential information. Use your critical judgment and discuss your choices with your supervisor.

2.5.3 Anonymisation. When doing research, we often deal with information that is confidential. Your informants would certainly like you to deal with it in a careful way so that their identity, their interests, or their business secrets are safeguarded. Confidential information therefore needs to be anonymised. The basic principle is the same as explained under interviews: present the information in a way that you're allowed to share it publicly and that protects the interests of your informants. You must therefore evaluate what can be shared publicly. Business secrets can usually not be shared. Provide only the information you need in order to support your argument. Even when you talk about a new technology, often not all the technological details are necessary to support your argument. Be lean.

From a methodological point of view, anonymisation reduces the robustness of your work. Indeed, good research keeps the "chain of evidence" from the source to the final results of the analysis. A researcher who picks up the results after you should be able to check your analysis based on your methodology and your data. Anonymisation makes this difficult or even impossible. There is therefore a tension between safeguarding the interests of your informants and disclosing the full chain of evidence. You need to find the right degree of anonymization.

In real life you will encounter more difficult situations than the example above. Your academic supervisors can certainly help you develop the feeling of what you can write or not. We recommend you to write your text with anonymisation from the beginning. It's much easier than to remove names, quotes, or entire passages later on.

2.5.4 Mathematics. If you write a more technical thesis, you should clearly state and discuss model assumptions, model specifications and derivations. Sentences like "under standard conditions…" are not informative and should be avoided. You will get a lot of credit for concisely discussing the assumptions you make and their limitations, because it shows how well you understand a particular model. If you use less standard mathematical or statistical methods, it is a good idea to discuss them in the text, and to document the details of the estimation procedure in the appendix. Similarly, lengthy mathematical proofs belong in the appendix.

2.6 Results. In the results or analysis chapter, you explain what you found out thanks to your analysis. Sometimes, it's worth first describing the phenomenon of your study before analyzing it in a second part. It's good practice to have your results only in this chapter, as this allows the reader to clearly see your contribution (i.e. the analysis of previous scientists is found in the literature review chapter).

2.7 Conclusion. The purpose of the conclusion is threefold. First, you want to bring all the threads of your argument together. Generally, there should not be too many of these (more than three gives the impression that you do not focus). Second, you should address the importance of your results. What can we do with your results? What could be the next steps? Third, put your work into perspective. What are the limitations of your argument? Which questions did you not address? However, a conclusion should never be long (say, more than 3-4 pages). In essence, the conclusion brings your study up to the general level again.

2.8 Appendix. The thesis should be complete in that it does not rely on materials or arguments outside of the thesis that cannot be checked by the reader on the basis of publicly available information. The reader should have access to all documents, so you have to provide access to those that are not publicly available. Similarly, spreadsheet models, computer programs, or data need to be available, either from a public source, in the appendix. The ultimate standard of what you should include is reproducibility: with your written guidelines and on the basis of the materials included, the reader should be able to follow your argument and reproduce your results. However, the appendix should not be used to circumvent the page limit, i.e. it should not contain material that really belongs into the main text.

2.9 Tables, figures, index. Tables and figures need to be numbered, have a title, must have short notes that tell the reader what the content is. They should also be self-contained so that you understand the information they provide without having to scan the text for necessary additional information, like what is on the axis of a graph, or what are the units of measurement. There should be a table of contents in the front, and an index to all the tables and figures (use titles here, not just "table 1," "figure 3," etc., otherwise the reader does not know how to find information in your text). Figures must be readable when printed in black and white. When two or more variables are plotted in the same graph they should be represented, e.g., with solid and dashed lines, not just two different colors.

2.10 Footnotes. Use footnotes, not endnotes. Your footnotes should make clear if you are referring to another document or another location in your thesis. Try to limit the number of footnotes.

3. Length and format

All formatting should aim at generating clarity and transparency. The reader has only a limited amount of time to spend on your document, and should not spend it searching for information because of a poor organization of your text. **The main text (without appendix and references) should have ideally around 30-40 pages but not more than 60 pages, 1.5-spaced, size 11** (e.g. Times New Roman, Arial, but not Arial Narrow), with at least 2.5 centimeters margins on all sides (this does not include the title page, appendix, index, and the table of contents). If you exceed the page limit without justifying this with the inclusion of relevant content, then you will receive a lower grade, so you do this at your own risk.

It might be counterintuitive, but it's easier to write a long paper than a short one. In short papers, the author needs to prioritize what he says, make choices, and have a clear line of argumentation. This shows that the text is well thought and mature. In a long text, the tendency is to write about everything that seems interesting with the hope that the reader will be pleased. The burden of making choices and developing a line of argumentation is shifted to the reader. That's not his job. Moreover, the reader would need to read a huge piece of text before being able to understand your point. As a reader, you would certainly not appreciate such paper and might not even finish reading it. It's the job of the author – yes, you will become a junior author ! – to write a concise, well written, neat and well argued piece of work.

The appendix may not be used for information that belongs into the text in order to circumvent the page limit. You may add up to 20 pages of numerical tables (e.g., regression results).

4. Citation and references

All information you have used needs to be cited. Please reference information from the internet and include the website. Include the exact title of the document: by the time the reader checks your sources the owner of the website may have moved the document somewhere else, so it has to be found with a search engine.

Please avoid old-fashioned formats for citations. Rather, have a table of references at the end of the main text, and sort it by author last names, date and title. Then reference by author and date (e. g., Black and Scholes (1973) develop a formula…) in the main text. If you cite word by word, you need to include page numbers for your citation. If you use LaTex, you can use bibtext to generate the bibliography automatically, in Word use for instance Citavi, Zotero, or Mendely.

There are different citation styles. We don't have a preferred style at E4S. Please see your academic supervisors. In case of doubt, the "APA style" is widely used and accepted.

The following sample reference list shows you how to reference journal articles, books, and articles in an edited book in APA style.

Aıt-Sahalia, Y. (2004). Disentangling diffusion from jumps. *Journal of Financial Economics*, *74*(3), 487-528.

Gupta, A. K., Smith, K. G., & Shalley, C. E. (2006). The interplay between exploration and exploitation. *Academy of management journal*, *49*(4), 693-706.

Black, F., & Scholes, M. (1973). The pricing of options and corporate liabilities. *Journal of political economy*, *81*(3), 637-654.

Feller, W. *An introduction to probability theory and its applications* (No. 310/F318). Wiley series in probability and mathematical statistics, 3rd edn.(Wiley, New York, 1968).

Yin, R. K. (2014). *Case study research: Design and methods (applied social research methods)*. Thousand Oaks, CA: Sage publications.

5. Plagiarism and cheating

Plagiarism is the representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas. It is imperative that you do not plagiarize. Sophisticated software exists that is very good at identifying plagiarism (e.g., turnitin.com) and your thesis will automatically go through such a process before arriving in the hands of your supervisor. Plagiarism and cheating, defined as falsification, fabrication, or dishonesty in creating or reporting research results, will result in an automatic failing grade.

Note on the use of AI

As of now, EPFL has no official position regarding the use of AI. While we encourage the use of AI in general, we suggest being cautious with its use in the context of a Master's Thesis. In case of doubt, your thesis supervisor is the person of reference to consult. Directly copy-pasting the output of chatGPT or other AI tools is plagiarism. Tools to detect AI texts are growing fast, so be careful.

The trend seems to be towards considering AI as an "entity" or person in its own right. This means that it either needs naming as an author, or being fully transparent on what has been done by AI. You would need to be transparent that, for instance, a part of the analysis, or a part of the proofreading was done by AI. Since the thesis is an individual work, you are not allowed to collaborate with other persons, or entities for that matter. The AI part would therefore necessarily need to be very limited and rather applied to information retrieval and analysis.

On a broader level, we see value in being able to write a text independently, and would find it problematic if one could obtain an MSc degree without being able to write (and having written) a manuscript of a certain importance, quality and scientific value in one's own hand. Even if we imagine that in the future we'll hardly ever write anything "by hand", who should still be able to write independently if not academics? These views are, of course, subject to debate and will evolve as our knowledge and practice of AI tools evolve over time. In case of doubt, and until we have a better grasp of the question on a collective level, the precautionary principle should apply and we recommend that you use it with caution and be transparent with your supervisor.

Note on coding

The code can be checked for plagiarism. Reusing other people's code is possible, but you should clearly specify which part of the code is new and which part is taken from somewhere

else, with appropriate references. For references, it depends: if you are coding in a Python file/notebook, you can write the source in the document; if you have a GitHub repository, you can write a README file with the source and details of the modifications made to the code. Be aware that if you use an existing code for cleaning data, for example, you might as well directly use the cleaned data.

You should also be careful not to use licensed code, which could be protected by copyright/copyleft. If you do so, you need to request authorization from the license owner. Even if the code is fully open-source, it's always a good idea to contact the author(s) of the code to clarify if they agree that using the code in that specific context is a good idea.

6. How to get a good grade

You definitely get a better grade if you adhere to all the ground rules laid down in this document, but that in itself is not enough. You also need to make a contribution with your master thesis and provide a well-reasoned analysis of your topic. The difference between a satisfactory thesis (in terms of Swiss grades, a 4.0) and a good thesis (4.5-5.0) is basically whether your thesis has significant analytic content or not. The distinguishing feature of a very good thesis (5.5-6.0) is that you really exceed expectations. As a base rule, a thesis that is good without major errors or problems and which deals satisfactorily with all the tasks that were agreed at the beginning without going into much depth would be a 4.0.

This is where you should seek your contribution:

Case studies. Aim for some analytic content and a thoughtful analysis. A purely verbal analysis of a company's strategy and carefully collected excerpts from company reports supported by light commentary do not qualify as analysis. Check books on methodologies in the social sciences to get a good understanding of what a good case study analysis should look like. Refer to the excellent book on case studies in social sciences written by Yin in 2014 (see reference above).

Empirical studies. Try to understand your dataset and carefully collect your data. Apply statistical methods thoughtfully and interpret your results. Intelligent commentary of results is more important than many tables.

Mathematical studies. Develop a new model or use new mathematical/statistical methods, it will contribute significantly towards a good grade. Theoretical contributions which are unrelated to the thesis do not count towards the grade.

7. Final comment

In case of doubt, discuss these points with your academic supervisor. She or he might have additional recommendations for you, and might have preferences regarding the citation style and the best practices regarding footnotes.

Writing a good paper is a bit of an art as well. Don't hesitate to study how other good academic papers are structured and written. Finally, there are multiple more extensive books that explain how to write a thesis. These precious resources to use.

Acknowledgements

The initial version of this document (2010) was written by prof. Rüdiger Fahlenbrach, using material provided by Professors Ernst Maug of University of Mannheim, Karen Wruck at Ohio State University, and Henrik Cronqvist at Claremont McKenna College.