Master's thesis and seminar in computer science

About the master’s thesis and the writing process
Literature on writing theses


Structure of the master’s thesis

- The length of the master’s thesis is typically about 60 pages
  - it varies depending on the topic and goal
  - theory part: 20-40 pages
  - practical part: 15-35 pages
    - may have a separate documentation
    - analysis, conclusions and comments: 5-15 pages

- Structure the manuscript before you start writing
  - table of contents
  - extended abstract
  - bibliography
  - approximate length
Typographic directives

- **Page layout**
  - 12 pt font (Times, Times New Roman or corresponding serif font)
  - sans serif font (Helvetica or corresponding) for titles
  - spacing 1,3
  - left margin 4,5 cm
  - other margins about 2,5 cm
  - page numbers
  - justified margins

- **Single sided printing**

- **The caption of a table is placed before the table**
  - without a full stop at the end of the sentence

- **The caption of a figure is placed after the figure**
  - ends with a full stop
Figures and tables

- Freely use figures, pictures and tables to illustrate what is described in the text
  - number them and provide them with a caption
  - refer to figures and tables in the text
    - indicate in the text when it is time to look at the figures
    - for example: "In Figure 2 the module is described with a class diagram."

- Explain abbreviations and technical terms
  - include an appendix with a list of abbreviations if there are many

- Avoid footnotes
The structure of the thesis (1/2)

- **Cover**
  - the final version of the thesis is bound in hard cover

- **Title page**
  - identifies the thesis

- **Abstract and key words**
  - short summary of the thesis and some key words

- **Table of contents**
  - division into chapters including page numbers

- **Preface**
  - short presentation of the work, thanks to co-workers

- **List of abbreviations**
  - if you use many abbreviations in the thesis
The structure of the thesis (2/2)

- **Introduction**
  - background, presentation of the problem, definition of the topic
- **The main text**
  - the main contents of the thesis
- **Conclusions/discussion**
  - summary of the results, conclusions of the work
- **Bibliography**
  - list of references to the used literature
- **Appendices, if any**
  - program code can be included in an appendix
Cover and title page

- The final version of the thesis is bound in hard cover
  - printed on the spine of the cover is the name of the author (first name + family name) and the year the thesis was written
  - at least 3 copies
    - for the supervisor, the IT department and the library
    - plus as many copies as you need for yourself, family and friends

- Title page
  - the title of the thesis
  - the name of the author
  - the type of work (Master’s thesis in computer science)
  - university, faculty, department (Åbo Akademi University, Division for natural sciences and technology, Department of Information Technologies)
  - date (month and year)
  - supervisor(s)
Abstract and table of contents

- **Abstract**
  - summary of the thesis to evoke interest in it
  - short description of the goal, used methods and results
  - self-descriptive, without literature references
  - about 200 words

- **2 - 6 keywords**

- **Table of contents**
  - chapter titles and subtitles with page numbering
  - page numbering starts from chapter Introduction
  - automatically generated by the wordprocessor
Preface and Introduction

- Preface
  - the goal of the work
  - the background of the work
  - the work process
  - acknowledgement and thanks to those who have assisted or financed the work

- List of abbreviations and terms
  - definition of the abbreviations that are used

- Introduction
  - background to the work, presentation of the problem
  - motivation, scope, limits
  - definition of the work
  - references to earlier and basic work in this field
  - should be clear and systematic, should evoke interest
  - The thread of your argumentation should be running, starting from Introduction
Main text

- The main text
  - Theory
    - foundation that the work is based on
    - literature studies
    - description of earlier work in the area
  - The practical part
    - presentation of the work, solutions, results, interpretation of the results
    - programming work is preferably presented 'top-down'
    - carefully planned software testing
  - Discussion
    - the author’s opinion of how well the goals were achieved and motivations for this opinion
    - thoughts on the general significance and applicability of the work
    - new ideas/questions that the investigation gave rise to
Conclusions and bibliography

• Conclusions
  – short and concise presentation of
    ▪ the main ideas of the work
    ▪ the final results and their significance

• Bibliography
  – contains only literature that is being referenced in the text
  – sorted in alphabetical order
  – preferably enumerated (referenced in the text via numbers)
  – There are many different ways to write the literature references

• Appendices
  – for example program code, design diagrams, questionnaires
  – appendices created by the author have page numbers
  – other appendices, such as copies, are placed at the end of the thesis without page numbers
Linguistic guidelines

- Clear and structured style
- Fluent and easy-to-read normal language (correct literary style)
- Scientific language
  - no clichés, no vague concepts
  - avoid colloquial style
    (of course, then again, as you can see, ...)
  - avoid jargon
Literature search

- Search for literature from different types of sources
  - books
  - scientific journals
  - conference proceedings
  - popular scientific periodicals
  - user manuals, user instructions, booklets
  - newspapers
  - web documents
The following are classed as scientific publications

- books
- scientific journals
- conference proceedings

These have passed a peer review

- have been checked by a number of (at least 2) experts within the area and have been found to fulfil the necessary quality requirements

Preferably use references to scientific publications rather than web documents
E-media

- The library of Åbo Akademi University
  - the Alma catalogue for books and printed journals of the library
  - the NELLI Portal with an SFX-service for electronic resources
    - e-journals, e-books, theses, encyclopedias
  - the Doria portal for dissertations at Åbo Akademi University
Search links of Åbo Akademi Library
– some examples

- Databases of Åbo Akademi Library (ex.)
  - Alma (main catalogue with search terms from Allärs)
  - Linda (catalogue covering all university libraries in Finland)
  - Nelli (National Electronic Library Interface) – meta search in several databases

- E-journals (ex.)
  - ACM Digital Library … ACM Journals and Magazines (journals in computer science and computer engineering)
  - IEEE Xplore
  - IEEE Computer Society Digital Library
  - ScienceDirect (digital library with journals and books)
  - SpringerLink (interactive database for journals and books)
  - Wiley Online Library (journals in Information Science and Computing)
Literature references

- **Purpose**
  - show what others have done
    - give exact source for direct quotations and ”borrowed” pictures or figures
    - give the reader a possibility to check, and read more

- **Form**
  - as a comment in the text
    ”The programming language C [1] was developed in the beginning of the 1970’s by ... ”
  - difference between quotation – report – reference
  - do not ”borrow” too much text directly from the sources – your thesis will be checked for plagiarism

- **Bibliography**
  - **must** contain all works that you have referenced
  - the form of reference depends on the type of publication
Examples of references

- **Book**

- **Journal article**

- **Article in conference proceedings**
Examples of references

- **Technical report**

- **Manual**

- **Web reference**
Tools for references

- Preferably use tools to organize your literature references
  - Bibliography Database in OpenOffice
  - LaTeX + BibTeX
  - RefWorks (Reference management, see https://www.abo.fi/bibliotek/bibrefhantering)
The writing process
Writing the thesis

The length of the thesis is typically about 60 pages
- 2-3 pages per week \(\Rightarrow\) about 6 months’ work

To achieve this the following is required:
- a detailed outline \(\Rightarrow\) manuscript structure
- that the text is written including references and the bibliography is extended gradually
- that the text is edited to become cohesive
- consider the writing of the thesis as a proper job

To get started:
- Rule 1: Don’t worry about minor issues
- Rule 2: All issues can be split into minor ones
Practical advice - Planning (1/2)

- Analyse the writing task
  - contents and composition
  - hypothesis or goal
  - target group
  - current state of research
  - source material
  - methods

- Define and refine your research question(s)
  - focusing
  - possibly an iterative process

- Motivate your choice of topic
Practical advice - Planning (2/2)

- Plan the collection of the material
- Plan the outline and presentation of the material
  - topic that may change during the working process
  - space for your own ideas
- Create a clear picture of the goal
  - to anticipate the final result
Practical advice to get started with the writing

- **Your own tricks to get started with the writing**
  - start to write about the subjects you know well and that you feel it is easy to write about
  - write at least 1-2 pages every day to get a routine
  - in the beginning quantity is more important than quality
Practical advice for the writing

- Do not leave the writing until the last minute
  - make notes while you are reading the literature
  - make careful references; it may be difficult to find the same material later
  - do research and writing in parallel

- Draw the figures at an early stage
  - illustrate the problem; the text explains the pictures
  - use many pictures, figures and tables

- Leave the introduction and conclusions last
Practical advice – Content

- Write text that is easy to understand
  - the first sentence in a paragraph defines the content
  - the following sentences describe the content more closely
  - choose your theme and stick to it, clear disposition
  - do not expect too much from the reader

- Spread out your material to get a better overview of it
  - divide, subdivide and structure the material
  - re-structure the disposition when necessary

- The message of the text should be clear

- Take an objective look at what you have written
  - read the material from the perspective of the target group
Practical advice – Supervision (1/2)

- Discuss with your supervisor before you start writing
  - make clear what the goal of the thesis is
  - and possibly also what grade you are aiming at
- Ask your supervisor to read your text
  - every once in a while during the writing process
  - to get his/her point of view on the outline and content
  - for expert help
- Don’t hesitate to ask if something is unclear
Practical advice – Supervision (2/2)

- Take initiative to discuss with your supervisor
- Ask for help to delimit the work, if it has become too extensive
- Contact your supervisor if you get stuck
Practical advice – Proceeding with the work

- Investigate the reasons for your possible frustration with the (creative) writing process
  - are you missing important information?
  - does your question formulation need to be clearer?
  - does your outline need to be re-structured?

- Do not get stuck!
  - check the advice given here
  - ask your supervisor for help
  - writing a master’s thesis is not impossible, if you make it a stepwise process

- Maturation process
  - ideas sometimes mature subconsciously
Practical advice – Final stage

- Let somebody else read your almost finished material before you hand it in for grading
  - avoid misspelling, misinterpretation etc.
  - use automatic spellchecking
  - take advantage of the writing supervision provided by the CLC
- Check table of contents and references carefully
- Finish
  - material search
  - writing
  - editing
  - No text will ever be perfect!