Final thesis instructions

Updated on 25 January 2017

Introduction

These instructions apply mainly to Master’s theses at Lappeenranta University of Technology. They may also be used, where applicable, for Licentiate theses, Bachelor’s theses and written assignments. The schools may give more detailed instructions on the preparation of theses.

The instructions start with a process description of the practical aspects of starting a thesis and of its assessment. Then, the contents of the thesis, conducting research and research methodologies are discussed. The final section deals with layout and gives practical examples of it.

The Master’s thesis is the final project of the Master’s degree studies. It demonstrates the student’s knowledge of a scientifically and/or societally important topic related to his or her professional field. The thesis is a research assignment that requires approximately six months of full-time work and amounts to 30 ECTS credits in the degree. The student must demonstrate the ability to carry out the project independently and following a plan.

The Master’s thesis is prepared in the second year of the Master’s degree studies, and before receiving approval of their thesis topic, students must have completed their Bachelor’s degree or complementary studies.

Final thesis process

Starting the work

Students who are starting their Master’s thesis should read these instructions and meet with a prospective first examiner, who is an LUT professor, docent or associate professor on the tenure track. The first examiner represents also a field closely related to the student’s thesis.

Before starting the work the following points are discussed with the first examiner:

- the prerequisites for starting the Master’s thesis (completed studies)
- the topic, objective and requirements of the thesis
- the approval of the thesis topic
- the preliminary research plan and schedule
- funding (by the student, a grant or an employer)
- the examiners of the thesis
- the supervisor from the commissioning organisation
- matters to be discussed with the community providing the funding and the supervisor representing it, such as the employment relationship, responsibilities, safety, insurances, invention rights, etc.
- publicity of the thesis

Receiving approval for a topic

Prerequisites for obtaining approval of the thesis topic are:

- Bachelor’s degree completed (when the student has been admitted into the university for both Bachelor’s and Master’s studies)
- possible complementary studies completed (if the student has been admitted to complete only the Master’s degree)
- possible other required studies announced by the school have been completed

The student applies for the approval of the topic and the appointment of the examiners from the first examiner. The application is submitted to the student services via e-mail.
The student submits the thesis application only after the required studies have been completed and the thesis topic has been confirmed with the thesis first supervisor. The title does not need to be finalised upon application; it may be modified during the course of the project.

The Master’s thesis is agreed on by the supervisor and the student together. The approval of the topic remains in force for two years from the date of approval. The first examiner confirms the second examiner for the thesis. The second examiner must have at least a higher university degree and may be from outside of the university.

Applying for Master’s thesis work at a company is the student's responsibility. If the student wishes to start preparations for the thesis before the topic is officially approved, this should be discussed with the first examiner.

The online forms to be filled in and sent via lut.fi e-mail, as well as further information on the topic application process, are available in the student portal Uni.

Assessment and publication of the Master’s thesis

Students must submit their final draft of the thesis to the first examiner for reading and assessment. This is called applying for imprimitur (i.e. an official licence to publish). After receiving the licence, the student saves the thesis and abstract documents to the LUTPub open access database and receives a URN address related to the work.

After obtaining the URN, the student applies for school evaluation of the Master’s thesis. This is done by submitting both the form entitled Assessment Application for Master’s Thesis (1B) and the requested enclosures to the student services via lut.fi e-mail.

The university decides the graduation schedule, and provides instructions on the evaluation.

The examiners prepare a written statement on the thesis and propose a grade. The title and grade of the thesis are shown in the degree certificate.

Students of Master’s programmes in English will be provided a statement in English on their Master’s thesis.

The schools determine the assessment criteria for final theses. Frequently applied criteria include e.g.

- The problem-setting, objectives, definitions and delimitations of the thesis
- The relationship to previous research
- The research approach, methods and material used in the work
- The schedule of the research and time management
- The results and their analysis
- The organisation and coherence of the work
- The profundness of the work
- The reliability of the work
- The language and layout of the work
- An independent approach and application

A Master’s thesis in technology is assessed on a scale of 1-5, where 1 is satisfactory, 2 is very satisfactory, 3 is good, 4 is very good and 5 is excellent. A Master’s thesis in business is assessed on the scale improbatur (failed), approbatur (lowest passing grade), lubenter approbatur, non sine laude approbatur, cum laude approbatur, magna cum laude approbatur, eximia cum laude approbatur sekä laudatur (highest grade).

If the grade of the Master’s thesis in technology is 5 or in business studies at least eximia cum laude approbatur, and the overall grade of the degree at least 4, the student has completed his or her degree with distinction.
The school assesses and approves the thesis only after the student has applied for the assessment, has applied for and received the imprimatur, and has submitted the thesis and abstracts to LUTPub. **The forms and further information are available in the student portal Uni.**

If a student is not satisfied with the evaluation, he or she may leave a request for correction with the degree board within 14 days of the day the grade was made known. The request for correction should be addressed to the degree board in question and submitted in writing to Records Services. Students must submit the request in writing within 14 days of the day the grade was made known. They also have the right to find out the grounds for giving the grade.

**Publicity of the thesis**

**Master's theses submitted to the university for examination are normally public documents.**

This must be mentioned to the commissioner when the topic of the thesis is first discussed. If the thesis includes information which the commissioner considers confidential, the university may agree to hold the thesis **confidential for a maximum of two years.** However, it is **recommended** that the thesis is prepared as a public-access document.

If part of the information needs to be held confidential for longer than two years, the information must be excluded from the version submitted for examination. The work will be evaluated based on the non-confidential part.

The first examiner shall see to it that the commissioner is aware of the publicity requirements from the very beginning of the discussions.

**Confidentiality notification**

If the thesis includes confidential information (held confidential for a maximum of two years), the commissioner of the thesis must submit a written notification of the extent of the confidential information, the reasons for confidentiality and the time the information is to be held confidential (in full years). The confidentiality period starts from the date the thesis is assessed. The student is responsible for submitting the confidentiality notification to the student services no later than in connection with the assessment application. The abstract is always public.

**Maturity test**

Students must complete a written maturity test on the topic of their thesis. Its purpose is to verify the student's familiarity with the topic of the thesis. During the course of the studies, also the student's Finnish or Swedish skills are assessed at one point. This can be done e.g. in connection with the Bachelor's thesis. The maturity test is assessed by the first examiner of the thesis, and as needed, also a language reviser approved by the university. The maturity test is taken in the language in which the student has received his or her education in Finland. If the student has received his or her education in a language other than Finnish or Swedish, the head of the programme determines the language of the maturity test. In such cases, only the contents of the maturity test are evaluated, not the language.

If a student has demonstrated his or her language skills in connection with the Bachelor’s degree or another previous university degree, the language of the maturity test will not be evaluated, only the contents. The abstract of the Master’s thesis serves as the maturity test.

Further instructions on taking the maturity test are available in the student portal Uni.
Content of the thesis and how to conduct research

Language of the thesis

The thesis may be prepared in Finnish, Swedish or English. Permission for using other languages is granted by the head of the programme. The author of the thesis is responsible for the language revision of the thesis. If the commissioner of the thesis requires the use of a language other than Finnish, the commissioner is responsible for the translation or language revision of the thesis. In degree or Master’s programmes in English, the thesis is prepared in English and the author is responsible for revising the language.

Inventions related to the thesis

The research work for a Master’s thesis may result in an invention that can be patented or otherwise protected by industrial law. An invention may be a new or improved technical devise or method with industrial or commercial importance.

Inventions must be discussed with all parties involved (the student, supervisors at the university and the commissioning company). If the invention made in connection with the thesis is to be patented, the patent application must be left before the work is published. Otherwise, the thesis must be written so that the invention is not revealed.

If the invention has ensued under an employment relationship, the Act on the Right in Employee Inventions (656/1967) is applied to the company. If the employment relationship is between the student and a university or higher education institution, the act on the right in employee inventions at higher education institutions (369/2006) is applied to the school.

General patenting legislation is applied to the patenting of an invention and general copyright legislation to copyright issues unless otherwise agreed by the parties involved in the work (the commissioner, university and student).

Further information is available from the university’s Research and Innovation Services.

Contents of the thesis

The thesis may be composed e.g. of the following items in the following order (some apply only to the technology or the business thesis):

Title page
Abstract in Finnish
Abstract in English
Acknowledgements
Table of contents
List of symbols and abbreviations
Introduction
Discussion (theories, background and implementation of the research)
Conclusions (analysis of observations and results)
Summary (concise summary of the above)
References
Appendices

Title page
The title page includes the title of the thesis. The title must be well-defined and correspond to the content of the thesis. A keyword, which expresses something essential about the thesis and has an explicit and specific meaning, is recommended as the first word. Avoid the following: some, review, method, report, study, equipment etc.
Abstracts in Finnish and English
The abstract is a concise (one A4 sheet), objective, independent summary of the Master’s thesis. It should be intelligible as such, without the original document. It explains the contents of the thesis: the objective, methodologies, results and conclusions. A good abstract is written in complete and concise sentences. The author does not express his or her opinions, but describes the thesis as would an outside reporter. No direct references are made to the original text.

The abstract is a public document, and therefore all confidential information must be excluded from it.

The abstract is prepared in Finnish and English. Both the Finnish and English abstracts are included in the thesis. The abstracts are also submitted to the student services as an annex to the assessment application of the thesis. Foreign nationals do not need to prepare an abstract in Finnish.

The author sends electronic copies of the abstracts or the entire thesis to the LUT library. More details are available from the library and its web site.

Acknowledgements
Acknowledgements are a brief description of what or who had an impact on the thesis. For example, the people who furthered the progress of the thesis may be thanked.

Table of contents
The table of contents lists the headings and sub-headings and their page numbers.

List of symbols and abbreviations (if needed)
Symbols, abbreviations and terms which are not common knowledge are listed in alphabetical order along with their definitions and arranged in groups: e.g. first Roman symbols, then Greek ones and finally abbreviations. The list of symbols and abbreviations is placed immediately after the table of contents.

Introduction
The actual research report is opened with an introduction. The purpose of the introduction is to introduce the topic and awaken the reader’s interest. The introduction briefly describes the background, material extent and aims of the thesis. The introduction relates the thesis to other research and sources and presents the research methodology applied. It also describes the key points and organisation of the research report. It does not, however, include detailed descriptions of the theory, methods or results. A good introduction is, nevertheless, significantly longer than a couple of pages, and is organised in a logical manner.

Discussion
The discussion is divided into chapters with headings that depict the organisation of the thesis (in exactly the same form as in the table of contents). In this section, the author relates all of the material he or she wishes in reply to the research questions posed, as well as the conclusions based on the material. Repetition should be avoided unless it is necessary. However, the discussion must be drawn up in such a way that a professional in the field can repeat the research work e.g. to check the equations, expressions, measurements, calculations or results and conclusions.

The language of the thesis must be error-free and the expression clear, accurate and concise. The topic must be presented to the reader unequivocally and intelligibly. Ideas should be developed logically and coherently. Say only what is important. Avoid wordiness and run-on sentences. Jargon and unnecessary foreign words should be eliminated.

The thesis is written in standard language and in the passive voice. Abbreviations, such as e.g. or etc. should not be used, but instead written out in their entirety.

In order for the observations to be of use to others, the stages of the research work must be presented in complete and the results of the observations in their original form in e.g. tables. Long sequences of equations and programming code are appended with headings. It is not necessary to show the derivation of the equations quoted, although the author must make sure the equations are...
presented correctly. However, the derivation of new expressions and equations introduced in the thesis must be shown, at least in outline. The author must also explain under which conditions the calculations, formulae and equations are applicable.

Conclusions
Depending on the nature and scope of the study, the report ends either with the chapter “Conclusions”, or two separate chapters, e.g. “Conclusions” and “Summary”. The conclusions analyse the observations and results drawn from the research. The conclusions examine and reflect on e.g. the compatibility of the theory and measurements, the reasons for possible differences, and summarise the conclusions drawn from the results. The need for further research and possible practical applications may also be argued here.

Summary
The summary is a concise description of the entire work: it presents the starting point of the research, the theoretical and empirical choices, aims, results, conclusions and possible ideas for further research. No new information is introduced in the conclusions, and no direct references are made to the discussion. The importance of the summary should not be underestimated because often the reader only reads the summary or the introduction and the summary.

Carrying out the research
The thesis is to be prepared according to good scientific practice. The research methods must be approved by the scientific community. The prevailing approaches and research methods in the field in question are to be applied. The student should learn about the research methodology and practices in his/her field sufficiently before preparing the thesis.

Plagiarism is absolutely forbidden. Citations and references must be made in accordance with good practice. If plagiarism takes place in an assignment, seminar report, Bachelor’s thesis or Master’s thesis during the supervision process, the examiner must tell the student that it is unacceptable. The thesis must be supervised so that the final version does not include references that violate good scientific practice. LUT uses Turnitin, a web-based service, for checking the originality and as a guidance tool for scientific writing of submitted students’ papers. According to the decision made by the Vice Rector, all theses must be checked with Turnitin before the final assessment.

If, despite the examiner’s efforts, the final version in the approval process contains plagiarised material, an assignment or report is failed, and a thesis is given a failing grade. Moreover, the matter will be brought before the rector.

Layout of the Master’s thesis
The presentation of the thesis is very important in terms of readability, intelligibility and reliability. A finished layout gives a good and reliable impression of both the work and its author.

Note: The term Master’s thesis is used for both Master’s thesis in technology (Diplomityö in Finnish) and Master’s thesis in business (Pro gradu-tutkielma in Finnish).

Layout of a Master’s thesis
On the front cover, the term Master’s Thesis is centred and printed about 100 mm from the top margin.

The author’s name and the year of publication are placed in the lower right-hand corner of the page. The recommended font style and size is Times 12 or Arial 11, and the recommended line spacing is 1.5. The left and top page margins are about 35 mm, and the right and bottom page margins are about 20 mm.

Each paragraph is aligned to the left, there are no indentations and there is an empty line between paragraphs. The paragraphs are justified.
Avoid long spaces between words: the use of the hyphenation feature of the word processing program employed is recommended.

The thesis should be approximately 70 – 90 pages.

**Parts of the thesis**

**Title page**

The title page is the first page of the thesis, page number 1. However, the page numbers are not shown before the first page of the table of contents. The information presented on the cover page is:

- Lappeenranta University of Technology
- Name of the school (School of Energy Systems or School of Engineering Science or School of Business and Management)
- Name of the degree programme (e.g. Energy Technology, Business Administration etc.)
- Name of the Master’s degree programme (if differs from previous line)
- Author’s name
- Title of thesis
- Type of thesis (Master’s thesis) and year of completion
- Examiners (the second examiner as well, if the student is aware of whom this is)

The layout of the title page should be balanced, such as in assignment reports.

**Abstracts in Finnish and English**

An abstract is prepared for all Master’s theses. You should favour the passive voice or the 3rd person active in case the abstract is published separately. Unestablished abbreviations, symbols or technical terms should be explained. Tables, equations etc. are used only if they are necessary for the sake of clarity. No direct references are made to the original text.

The abstract is done in both Finnish and English (equivalent contents). In the Finnish abstract, the title is in Finnish and in the English one in English. Foreign students do not need to prepare an abstract in Finnish.

The complete identification information should be included in the beginning of both the Finnish and the English abstract.

- Author’s name
- Title of thesis
- Type of thesis (Master’s Thesis) and year of completion
- Lappeenranta University of Technology
- Name of the school
- Name of the degree programme
- Name of the Master’s degree programme
- Number of pages, figures, tables and appendices
- Examiners
- Keywords in Finnish
- Keywords in English

The keywords must be informative and describe the contents of the thesis accurately. Concrete concepts (e.g. equipment) are in plural, abstract ones (e.g. methods) in singular. A good title should include at least some of the most important keywords. The number of keywords should be three to five.

*In addition to these general instructions, the schools may give further guidelines on e.g. the layout of the abstract (e.g. students may need to fill out a form).*
Acknowledgements

The acknowledgements recognise the help, guidance, advice etc. provided by others and give thanks to them. Also the commissioner of the thesis is mentioned. The acknowledgements are concluded with the author's name and the date after which no more modifications have been made to the work.

Table of contents

The table of contents must show the page numbering starting from the first text page. Please note that the first page (number 1) of the thesis is the title page. Thus the table of contents may be e.g. on page 5. A separate list of figures and tables can be included at the end of the table of contents.

Decimals and indentations are used in the table of contents – as well as in the headings in the text – according to the following example (note the use of upper and lower case lettering and the indentation of sub-headings). Please note that no more than three levels of headings are allowed. If there is need for more detailed sub-headings, they should not be numbered. If variables need to be used in the first-level headings, they are to be written out as they are in equations. In such cases, the author and the supervising professor may decide on the most appropriate way to present the headings in order to obtain a neat and legible layout. The page numbers are aligned to the right.

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Discussion

Each citation in the discussion should be clearly referenced so that the reader may refer to the original source.
The nature of the work determines the formulation of the discussion. The discussion may often be divided into a theoretical part, empirical part and results:

- the theoretical background, including the literature and previous research and concepts on which the thesis is based
- observations and collection of basic material etc. In order for the observations to be scientifically valid, the research process should be described in as much detail as possible.
- the discussion on observations and presentation of the results are often closely connected. All calculations need not be shown, as long as the author explicitly explains how they are done.

Figures, tables, equations etc. make the discussion more concrete and enhance readability. They are captioned and numbered, each as their own group.

**Equations** must be written clearly, each on their own line so that they are separated from the text. They may, for instance, be indented. Equations are numbered either consecutively or by chapter. The number is written in parentheses on the right-hand side of the column. References to an equation can be made only after it has been presented, with certain exceptions. Figures and tables are captioned and numbered similarly to equations. Figures and tables have to be referred to in the text, preferably before they are introduced. **The captions of tables are placed above the table and those of figures below the figure.** The variables in the figures are presented in the same way as in the text and equations.

In mathematical presentation, the author must use standard symbols if such exist and if not, other established symbols. In the absence of established symbols, the author may create new ones.

The name of a unit symbol, e.g. the electric charge \( Q \), must be mentioned when it is first introduced in the text and repeated when needed. Standard conventions must be followed when marking variables. For instance, variables in equations, charts and figures are **written in italics**, **vectors in bold italics** (or in italics and topped with an arrow, \( \vec{E} \)). Subscripts and superscripts or numbers are not italicised unless they refer to a variable. For example: There is a relationship between the electric field strength \( E_1 \) and the electric flux density \( D_1 \), which depends on permittivity \( \varepsilon \).

\[
D_1 = \varepsilon E_1. \tag{4}
\]

As in Equation (4) above, equations may be treated as elements of a sentence, which means punctuation, such as commas and periods, may also be used in connection with them.

Mathematical functions and operators are written in normal text type (\( \sin, \log, \lim \), etc.).

Matrices may be treated as ordinary variables, in which case their symbols may be bolded, e.g. tension matrix \( \mathbf{U} \). Equations may be used as parts of sentences with normal punctuation. Punctuation marks are placed immediately after the equation, not its number.

Standardised graphic symbols are used in drawings and graphs. Their figures and variables are expressed in the same way as in equations.

**References**

Listing references and the related ISO 690.2 and SFS 5342/1987 standards are presented in detail by Mälkiä (1994). In the commonly used name-and-year system (the Harvard system), the reference list is alphabetised according to the first author of the source. If several sources by the same author or group of authors are referenced, they are listed in order of publication starting from the oldest one. When referencing several sources published by an author within the same year, they are distinguished from each other with a lower case letter after the publication year (1999a, 1999b etc.). If the author is unknown, the abbreviation Anon. may be used instead of the author's name. Alternatively, the name of the publication may be used as the reference.
References to oral communication (e.g. from a lecture or seminar) or unpublished sources are also listed. The sources must be critically evaluated. The reference list must also indicate where rare and less known sources are available.

The references may not include sources that are not cited. The sources should be described in detail and in the same way.

Sources are usually referenced as follows:

**books**

- author(s), editor(s)
- publication year
- title
- edition (if more than one)
- place of publication
- publisher (NB: not printing press! Excluding company form abbreviations)


Sources with many volumes are presented in the same way, and the volume in question is also mentioned.

**journal papers**

- author(s)
- publication year
- title of paper
- title of journal
- volume (annual set)
- issue
- pages


**publication series**

- author(s)
- publication year
- title of publication
- body in charge
- place of publication
- publisher
- title and number of series


**final theses**

- author
- year
- title
- type of thesis
  (doctoral dissertation, Master’s Thesis etc.)
- institution and department

If you reference a compilation, introduce the parent publication with the word “In:” or type it in capital letters.

conference papers
author
publication year
title of paper
name, place and date of conference
place of publication
publisher or conference organiser
pages

For example: Sandström, J. 2001. How to reduce the complexity when formulating cost information for design engineers? 16th International Conference on Production Research (ICPR), July 23 - August 3, Prague, Czech Republic.

Electronic Publications

Electronic sources are referred to according to the SFS 5989 standard. Further information: the library web site www.lut.fi/fi/kirjasto, the library’s SFS standard collection and the library administrators. Electronic documents should be referenced only if no other original source exists.

Example of e-mail source:
- Bergman, S. 1996. The Iceland Teacher Training School in the field of biology, science education and development work in environmental education. [e-mail]. stefanb@khi.is 28 June 1996.

Example of Internet source:

Referencing (citations in the text)

Citations from books, journals, publication series and theses follow the same guidelines as the list of references. Citations include the following: author(s), year, pages. Thus referencing can be done as follows: "Williamsson (1995, 23-25) states" or (Teece et al. 1986). Mälkiä also discusses citations.

If there is more than one author, the first author’s name is followed only by “et al.” This is also how you should cite electronic sources, for instance (Denning 1996). Do not include the web site address – it should be indicated in the list of references. If several sources are referenced at once (e.g. two different authors cited in one paragraph), they should be separated with a semicolon and in parenthesis (,).

You should pay attention to where you place the reference. If you want the reference to include the entire preceding paragraph, place it in parenthesis after the final period. If you only want it to include the preceding sentence, place the period after the second bracket. This should also be done within a paragraph. Direct quotations should be in quotes. If you cite the same source twice in a row, the latter may simply be marked: Ibid.

The instructions above are merely guidelines, they are not binding. Referencing may be done in another commonly approved way or following the examiners’ instructions. The key to referencing is consistency.

Schools may issue their own instructions for authors to follow. Authors must also take into account the requirements set by the language of the thesis.
Footnotes

Footnotes are only used for explanations and additional comments on the text and are numbered separately for each page. Footnotes are placed at the bottom of the page and separated from the actual text with a line approximately 5 cm long. There should be an empty row above and below the line.

1.1.
1.2.

Appendices

Appendices may include equations, diagrams, drawings, forms, etc. that do not need to be included in the actual text but to which a reference is made. Extensive additional reports, large tables and e.g. tables that are referred to often should be appended. However, figures, equations, tables, etc., which are a key part of the text and are also interpreted, are placed in the text. The appendices should not, however, contain anything irrelevant to the thesis.

The heading of an appendix is written at the top of the page. Appendices are numbered. Appendix pages are not numbered; only the final numbered pages of the thesis are part of the table of contents. Appendices and their headings may be listed at the end of the table of contents. If the appendix consists of several pages, the pages are marked as follows:

For example: 1 Appendix I, 1
Appendix I, 2 etc.

For example: 2 Appendix 1. Heading
• (continued on page x) is written at the bottom of the page
• (Appendix 1 continued) is written in the upper right-hand corner of the following page.

REFERENCES

ISO 690-2:1997 Information and documentation—Bibliographic references—Part 2: Electronic documents or parts thereof


Jaana Sandström
Vice-rector for education