Title of your academic work

SUBMITTED AS A BACHELOR THESIS

to obtain the academic degree of

Bachelor of Science in Engineering (BSc)

by

Carol Lawson

September 2020

Thesis supervisor

FH-Prof. Dr. Peter Morris
**PREFACE/ACKNOWLEDGEMENTS**

The preface contains a short description of the topic; words of thanks to companies, mentors, supervisors, family members, etc., for their support are optional under consideration of relevant data protection terms.

### 1.1 USE OF THE TEMPLATE

This document is a template and contains optional lists. Lists that are not required (list of abbreviations, glossary, list of figures, list of tables and list of equations) may be deleted after consultation with your supervisor. Please discuss with your supervisor in advance which format, reference style, structure of chapters, etc. is to be used. Course-specific regulations might be included in an additional document. Please contact your supervisor on this matter.

The examples provided in this template are for your information only. Replace them with your own text after reading them carefully. Delete unnecessary information. Please keep in mind that automatic numbering is shown correctly in the document as a whole only after you have deleted sub-chapters of the preface which explains the template.

When printing, confirm that the directory is to be updated as a whole at every notification.

The present format template was prepared to the best of our knowledge and judgement. However, it is used at the users’ own risk with regard to the possible loss of data, computer problems or financial and material damage which may result from the use of this template. The authors of the present format template and the University of Applied Sciences Upper Austria do not accept any liability for the correct functionality of this template.
1.2 **HEADINGS**

With respect to headings, consider the following points for the formulation of a table of contents:

- Do not use unknown abbreviations in headings
- No full stop at the end of headings
- Make sure that a heading – without associated text – is not situated on the last line of a page; a page should also not start with a single line which belongs to the paragraph on the previous page.
- The degree of detail corresponds to the focus and emphasis of the thesis
- Always use at least two sub-chapters in one chapter; otherwise do not use sub-chapters
- Use a maximum of 5 levels of sub-chapters

For illustration purposes, the headings for levels 3 to 5 are:

1.2.1 **HEADING OF LEVEL 3**

1.2.1.1 **HEADING OF LEVEL 4**

1.2.1.1.1 **HEADING OF LEVEL 5**
1.3 **SHORTCUTS**

You can allocate the following format templates in a text by pressing the specified keys simultaneously.

*Table 1: Shortcuts for format templates of the FH*

<table>
<thead>
<tr>
<th>Shortcut</th>
<th>Format template</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Alt] + [1]</td>
<td>Heading 1</td>
</tr>
<tr>
<td>[Alt] + [2]</td>
<td>Heading 2</td>
</tr>
<tr>
<td>[Alt] + [3]</td>
<td>Heading 3</td>
</tr>
<tr>
<td>[Alt] + [4]</td>
<td>Heading 4</td>
</tr>
<tr>
<td>[Alt] + [5]</td>
<td>Heading 5</td>
</tr>
<tr>
<td>[Alt] + [T]</td>
<td>FH title for lists</td>
</tr>
<tr>
<td>[Ctrl] + [T]</td>
<td>FH subscripts for tables</td>
</tr>
<tr>
<td>[Alt] + [B]</td>
<td>FH subscripts for figures</td>
</tr>
<tr>
<td>[Alt] + [R]</td>
<td>FH subscripts for equations</td>
</tr>
<tr>
<td>[Alt] + [F]</td>
<td>FH running text</td>
</tr>
<tr>
<td>[Alt] + [O]</td>
<td>FH running text without following space</td>
</tr>
<tr>
<td>[Alt] + [M]</td>
<td>FH running text with previous space</td>
</tr>
<tr>
<td>[Alt] + [P]</td>
<td>FH dash for lists</td>
</tr>
<tr>
<td>[Alt] + [C]</td>
<td>FH greater-than sign for second level listings</td>
</tr>
<tr>
<td>[Alt] + [Z]</td>
<td>FH citation for direct quotations exceeding three lines</td>
</tr>
</tbody>
</table>
1.4 QUICK PARTS

It is necessary to add the abbreviation *Fig.* to be able to cross-reference figures you inserted via quick parts. To do this, select the function *Insert Caption!* on the tab *References!*, then click on the button *New Label!* and enter *Fig.*

1.4.1 FIGURES

You can insert a place holder for a figure with automatic caption using the tab *Insert! Quick Parts! Figure!*

*Fig. 1: Example of a figure with caption*

Consider the following points when using figures:

− Figures must be referenced within or linked to the text; otherwise they are superfluous. To do this, use the cross-referencing function on the tab *Insert!*
  
  [see *Fig. 1 on page V*].

− Not every figure needs to be in the text. Analyses, tables, backup information, etc. can be collected in the appendix. However, the text should reference them.

− If necessary, add a legend in the figures and the necessary references.
1.4.2 **TABLES**
You can insert pre-formatted tables with captions using the tab *Insert! Quick Parts! Table!*

*Table 2: Example of a table with caption*

<table>
<thead>
<tr>
<th>Column heading</th>
<th>Column heading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text</td>
<td>Text</td>
</tr>
</tbody>
</table>

Tables must be referenced within or linked to the text [see Table 2 on page VI].

1.4.3 **EQUATIONS**
In Word, equations must be created using the Word equation editor. With regard to the layout of equations, consult the rules and examples provided in relevant specialist literature.

\[ f(x) = a_0 + \sum_{n=1}^{\infty} \left( a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right) \]  
(1.1)

Usually, equations are integrated into sentences. They may form part of the main body of the text or be written separately on their own line or in their own paragraph. In the latter case an equation may be numbered and the relevant number used to refer back to the equation later in the text. Example of a cross-reference: see Equation (1.1) on page VI.

To create such a cross-reference, click on the tab *Insert! Cross-reference!*, select the reference type *Equation* and set the *Insert reference to heading to Entire caption or Page number*. You can insert a place holder for an equation with automatic numbering by going to the tab *Insert! Quick Parts! Equation!* and then insert your own equation. To do this,
In physics, Newton’s law $F = ma$ is one of the fundamental laws of nature.

The general form of a Fourier series is

$$f(x) = a_0 + \sum_{n=1}^{\infty} \left( a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right)$$

where $a_n$ and $b_n$ are called Fourier coefficients.
1.5 REFERENCE OTHER SOURCES

For citations, you are free to choose one of the following options:

- insert citations manually;
- insert citations using a bibliographic software.

The main point for you is to enter all citations and literature references correctly, i.e. according to section 1.5.3 on page X and section 10 on page 12, respectively. Agree with your supervisor how to reference sources and to use citation templates when you start working on your thesis. Using citation templates may necessitate manual modifications before you submit your thesis.

1.5.1 IMPORTANT NOTES ON REFERENCING

- Direct quotations (usually with quotation marks) and indirect quotations (without quotation marks) are distinguished.

  Every citation must be verifiable and correctly documented. The correct use of citations is an expression of scientific accuracy. Ideas taken from outside sources are always to be marked clearly as a citation – regardless of whether direct or indirect quotation.\(^1\)

- Integrate short direct quotations within the main body of the text. For direct quotations exceeding three lines in regular formatting, use the format template \textit{FH citation} and use the format template \textit{FH running text without following space} for the preceding text. Quotation marks are not used in this case:

  \begin{quote}
  \textit{Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Maecenas porttitor congue massa.}
  \textit{Fusce posuere, magna sed pulvinar ultricies, purus lectus malesuada libero, sit amet commodo magna eros quis urna. Nunc viverra imperdiet enim. Fusce est. Vivamus a tellus.}
  \end{quote}

- “Plagiarism is not only a direct quotation without quotation marks, but also an indirect quotation presented as if it was derived from one’s own findings.”\(^2\)

- Quotations immediately following a heading should only be used in exceptional cases.

\(^1\) Translated from Karmasin/Ribing, 2011, p. 116.
\(^2\) Translated from ibid.
− The content of citations must not be changed.

− All statements without (a) reference(s) are your own point of view, findings or generally known facts.

− Translations must be indicated in the relevant source reference.

− Numbers have scientific relevance only if they can be verified. Thus, a reference is always needed when numbers are presented.

1.5.2 Using direct and indirect quotations

− Texts taken word for word from the source must always be in quotation marks, except for block quotations (see above). Always use the English quotation marks (‘ ’), not the German quotation marks („ “) to highlight a quotation. If a quotation already contains quotation marks, change it into single quotation marks (‘ ’):
  Müller writes: “In the old days, the authorities had the financial power ‘firmly’ in their grasp” [Müller, 2010, p. 5].

− Your own additions and amendments must be put in square brackets. The content of the citation must not be changed:
  According to Müller, “in the old days, the authorities [had] the financial power […]” [Müller, 2010, p. 5].

− Omission of one or several words is indicated by three dots in square brackets. Ellipses can be inserted with the key combination [Alt] + [Ctrl] + [.] (do not use three full stops!).
  “In the old days, the authorities […]” [Müller, 2010, p. 5].

− For indirect quotations, indication of the source without citation marks is sufficient:
  According to Müller, the authorities had control over the finances [cf. Müller, 2010, p. 5].

− Repetition of the same citation can be marked with ibid. However, there must be a direct connection to the reference:
  According to Müller, the authorities had control over the finances [cf. Müller, 2010, p. 5]. The lower classes did not have any power [cf. ibid., p. 7].
1.5.3 Different types of citations
Talk to your supervisor to agree upon the types of citation to be used.

1.5.3.1 Reference within the text (PDK)
Meier claims that this aspect is important [cf. Meier, 2011, p. 5].
Meier says that “this point […] is relevant” [Meier, 2011, p. 5].

1.5.3.2 Reference in the footnote (MeWi)
Meier claims that this aspect is important.³
Meier says that “this […] point is relevant.”⁴

1.5.3.3 Reference within the text with numbers (VTP, MeWi, MKT)
This aspect is important [cf. 2, p. 5].
According to [2, p. 5], this aspect is important.
Meier claims that this aspect is important [cf. 2, p. 5].
Meier says that “this […] point is relevant” [2, p. 5].

---
⁴ Meier, 2011, p. 5.
1.6 **STYLE**

- Pay attention to gender-neutral language (see the statutes of the University of Applied Sciences Upper Austria in their current version).
- Always use the same documentation style. Consistency is regarded as an important aspect of scientific work.
- The thesis is not a personal essay. Avoid personal pronouns, such as I, you, we, etc. With respect to the aspired neutral writing style, also avoid emotionally charged words.
- Do not use colloquial language, e.g. *Suddenly, something happened* ...
- Pay attention to correct spelling, grammar and punctuation: there is a comma before the word *etc.* in English. There is no space between e.g.
- Do not use buzz phrases or sentence fragments; rather, use complete sentences containing a verb (listings are the only exception).
- Nested sentences must be avoided as best as possible.
- Subordinated clauses that explain a statement should be independent sentences whenever possible and should not be put inside another sentence.
- Brackets are to be used only for the following:
  > literature references
  > reference to other text passages such as tables, figures, etc.
  > definition of abbreviations used
- Hyphens are used to connect composition words and for syllable division. You can activate the syllable division manually at the end of a line by using an optional hyphen. To do this, click into the respective word at the desired point of division and press the keys [Ctrl] and [-] simultaneously.
- Do not use a hyphen instead of a dash. Insert dashes by using the key combination [Alt] and [0150].
- A sentence ends with only one dot (full stop), even if the sentence ends with an abbreviation. Delete unwanted double spaces. Use a nonbreaking space between a number and its unit by pressing the keys [Ctrl], [Shift] and [Spacebar] simultaneously in order to avoid an unwanted line break after the number.
- If different font weights (bold, small print, etc.) are used, the reason for this should be clear.
− Do not highlight something twice by using bold print and underlining. Do not use contractions such as don’t.
− Good English is characterised by shorter sentences rather than long, complex ones.
1.7 **LEGAL ASPECTS**

1.7.1 **SWORN DECLARATION**

The sworn declaration is not just a formality but the legally binding statement that all the materials used for your thesis are indicated and highlighted in the text using the prescribed formats. A serious infringement of these referencing guidelines is a breach of the sworn declaration from a legal point of view. Such a thesis will be rejected by the examiner in accordance with the relevant examination rules.

If attempts at deception or fraud are discovered, the thesis will be declared invalid and a new thesis with a new topic must be prepared. This will reduce the number of possible graduation attempts.

An academic degree obtained through deception or fraud will be disqualified by the awarding institution if the infringement is discovered later. The examination is regarded as failed.

1.7.2 **COPYRIGHT**

Copyright protects the intellectual property of authors provided that this work is entirely their own. The authors alone decide whether and how their work is to be published (reproduction and distribution right).

The core aspect of copyright is that it is not transferable. No one is allowed to declare somebody else’s work to be their own. It is not necessary to apply for copyright; it becomes effective due to the law, i.e. each manuscript is protected upon creation.

During work on the thesis and supervision of the student, the regulations of the copyright law, Federal Law Gazette No. 111/1936, must be observed.
1.7.3 TRADEMARKS

From a legal point of view, you are not obliged to mark trademarks or registered trademarks in academic papers. However, there may be different recommendations in individual disciplines. If you want to indicate (registered) trademarks in your thesis, you can do so by using a wording along the following lines:

[Trademark 1 and trademark 2] are registered trademarks of [company X].
SWORN DECLARATION

I hereby declare that I prepared this work independently and without help from third parties, that I did not use sources other than the ones referenced and that I have indicated passages taken from those sources.

This thesis was not previously submitted in identical or similar form to any other examination board, nor was it published.

This printed thesis is identical with the electronic version submitted.

.................................................................

Carol Lawson

Wels, September 2020
Abstract

**Abstract**

The abstract should meet the following criteria:

- Complete summary of the thesis in *English*
- Not longer than one page
- No description of complicated facts
- Clear definition of the problem, objectives, approach, methods used, results and solutions
The Kurzfassung should meet the following criteria:

- Complete summary of the thesis in **German**
- Not longer than one page
- No description of complicated facts
- Clear definition of the problem, objectives, approach, methods used, results and solutions
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1 INTRODUCTION

With respect to the title of the topic, the aim of the thesis must be explained first. The current situation, already known solutions, deficits and weaknesses of existing technical and/or economic solutions, market requirements, trends, increased quality demands, environmental demands, etc. should be presented. Also, it should be shown how these form the basis of your research question. Methods used to answer the research question can be highlighted in order to create a link to the subsequently discussed fundamentals.

- Volume: max. 3 pages, not too detailed
- Aim: arousing interest
- Focus: initial situation, research question (very detailed), framework conditions, weaknesses of existing solutions
- Motivation: why this topic?
- Challenge: what is new? (research question)
- Definition of the project: how should the problem be solved?
- Objectives and non-objectives
- Steps of the solution process with note “solved” or “not solved”
2 MAIN CHAPTER 1

Depending on the nature of the problem, this chapter should present the following briefly and in a way that the ideas for solutions, new concepts, process optimisation, results and conclusions can be understood and accepted by appropriately qualified readers:

- The theoretical basis used in your thesis
- Acknowledged methods of calculation and processes
- Methodological regulations and concepts (e.g. VDI standard 2221 “Methodological design”, TQM/TPM concept, ABC analysis, standards, etc.)
- Technological and physical foundation (material issues, manufacturing processes, physical laws, etc.)
- Economic methods and figures
- Legal basis
3 MAIN CHAPTER 2

This section deals in particular with your contributions to the thesis and may be subdivided into the following points, if necessary:

– Analysis of current situation
– Results of patent reviews
– Description of state-of-the-art technology
  > Review of literature with direct connection
  > Information on existing solutions for aspects of the problem
  > Discussion of the relevance with respect to your work
  > Demonstration of your expertise in the area
  > Factual presentation preferred
  > Not just a listing of facts!
– Presentation of target specifications for the actual state
– Calculations
– Tables and diagrams
– Concept development
– Principle sketches and/or construction drawings
– Prototype development
– Problem solution and test results (especially your contributions towards the problem solution; presentation of results as detailed as necessary):
  > Analyses of initial situation and determination of approach to the problem
  > Development of the concept and of the basic approach
  > Detailed presentation of the development of solutions with all calculations, constructions, programme steps, tables and diagrams, etc.
– Results, findings and innovation
– Evaluations, etc.
The original ideas, innovations and technological developments must be explained and presented with appropriate detail.
Discussion

- Discussion of approach, methods (pro and con)
- Results, findings and their discussion with respect to objectives
- Explanation of deviations
- Your opinion about the result
4 SUMMARY/CONCLUSION

This chapter should contain the following points:

- Problem, aim (very briefly)

- Approach, problem solutions and concepts including their functional and/or technical and/or economic evaluation

- Short presentation of findings, central results, innovation of this work

- Conclusions and, if possible, prospect for future applications and development of solutions to meet the aim
The list of abbreviations can be used for a great number of abbreviations. List the abbreviations in the list in alphabetical order.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The glossary can be used for topics with a great number of specialist terms. This makes a definition within the text unnecessary and makes it easier for the reader to look them up (example: terms specific to the e-commerce area, etc.).

After completion, arrange the glossary in alphabetical order.
7 LIST OF FIGURES [OPTIONAL]

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The list of figures can be used for a great number of figures.
8 LIST OF TABLES [OPTIONAL]

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The list of tables can be used for a great number of tables.
9 LIST OF EQUATIONS [OPTIONAL]

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Fourier series</td>
<td>$f(x) = a_0 + \sum_{n=1}^{\infty} \left( a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right)$</td>
</tr>
</tbody>
</table>

The list of equations can be used for a great number of equations.

If necessary, copy the equations you used into this list of equations after completion of your thesis.
10 References/Bibliography

Below you will find two sample references sections (bibliographies) covering the main types of publications (Internet source, standard, monograph, article in a book, technical rule, article in a specialist journal). Information on other publication types can be found in ONR 12658 (for German) and in ISO 690 (for English), both of which are cited below. ONR 12658 and ISO 690 are available in the library of the Wels Campus.

10.1 Bibliography for literature references within the text (PDK) or within a footnote (MeWi)


ISO 690:2010. Information and documentation – Guidelines for bibliographic references and citations to information resources.


10.2 Bibliography for numeric references in square brackets (VTP, MeWi, MKT)


**Appearance**

The appearance of the list of references varies depending on the reference style that you must apply in your thesis [see section 1.5.3 on page X].

**Division**

The list of references can be sub-divided into the following sub-sections, if necessary:

- Primary literature
- Secondary literature
- Tertiary literature

**Literature search**

On the Internet pages of the library of the Wels Campus, you can find a very detailed list with numerous links to:

- electronic journals
- databases
- numerous libraries
- catalogues of the book trade
- patent agencies

The library staff are happy to help you with your literature search.
The appendix contains supplements such as regulations, instructions, detailed data, detailed design drawings, etc., if they are necessary to improve understanding of the context.