

University of Gävle

# Writing Guide

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For Theses Written at ATM

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2018-10-29



## **Preface**

The Preface is a product of the student. In the Preface it is customary to thank those which considerably have contributed to the thesis. However, bear in mind that not everybody wishes to be recognized.

The Preface may not exceed one full page!



## **Abstract**

The Abstract is a summary of the thesis assignment, and should contain all major parts of the work. Nothing which is not found in the report may be presented in the Abstract. However, in the Abstract brief information is presented on, e.g. aim, method, results, and conclusions.

The Abstract may not exceed one full page!



## Table of contents

*Reference to pages where chapters and subsections may be found.*

**Never edit the text directly in the Table of contents on this page.** (Except if you use Appendices, then you will have to follow the Notice below.)

In this document the Table of contents (ToC) is automatically updated by positioning the cursor somewhere over the ToC surface and left-clicking with the mouse.

1. On the top left corner of the border that appears surrounding the ToC click “Update Table...” (Which is also indicated with an icon showing a document with a big red exclamation mark (!) on the side.) .
2. Select “Update full table” only if you made changes involving removing or adding chapters, or changed a chapter title text. Otherwise, if you only added (or removed) text and figures it is sufficient to select “Update page numbers only”.

**Notice** that the Appendix page numbers may change from e.g. A1 to just 1 when updating. This is fixed by adding the letter A in front of the automatically generated page number in the table below.

**Delete this text box before publishing your thesis!**

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# 1 Introduction

The text body of a thesis submitted at the Faculty of Engineering and Sustainable Development (ATM) at the University of Gävle should be written according to the following standard: Use the font Perpetua 13 pts. Line spacing 1,15. This is done throughout the text in this template, and if you stick to the given format you do not have to worry about that. Exceptions are various text elements, such as the chapter headings, figure and table captions, direct citations, and listings, which are given in another font and font size. These are all given in Table 1, below, to help you give your thesis a uniform and professional look.

## 1.1 References

In the text you will need to include references to support your statements, or on what or from whom you got your ideas. Within the disciplines of electrical engineering and computer science referencing is made according to the IEEE Citation Style; if you are writing in another discipline confer with your examiner or supervisor which citation style you should use. Using the IEEE style references are always given within square brackets and numbered in the order of appearance in the document, e.g. like this [1].

Note that references usually are inserted in the end of the sentence or paragraph upon which the discussion is based. However, they may also appear in the middle of a sentence [2], [3] for example when contrasting two or more statements [4] or similar. A reference that has already been introduced earlier in the document keeps its original number if it is used later, like here [1].

## 1.2 Figures and Tables

Most likely you will want to include figures and/or tables in your text; if so they shall be numbered in order of appearance regardless of chapter numbering. References, figures and tables are numbered in individual number series, all starting with 1, continuing with 2, 3 and so forth. Neither figures nor tables may be numbered including chapter numbers. In the running text there should be a reference to the figure, see Fig. 1. And shortly after that the figure itself should be presented with a figure caption.

A *figure* is any graphical element that is not a *table*, including photographs, diagrams, charts, circuit diagrams, block diagrams, flow charts etc. In short: If it is not a table it is a figure. All figures shall have a caption text starting with “Fig.” located **below** the figure, see Fig. 1.

Table 1. Introduction to the different text formats used when writing theses at ATM. Note that since this caption covers more than one line it is flushed left.

<b>Name</b>	<b>Function</b>	<b>Short description</b>
<b>HiG Brödtext</b>	The normal body text in the document.	Perpetua, 13 pt; flush left; line spacing 1,15
<b>HiG Citat</b>	When a citation is longer than one line it shall be indicated using this format.	Perpetua, 12 pt; italic; indented 1 cm from left and 1,5 cm from right; single line spacing
<b>HiG Figurbeskrivning</b>	The figure caption below each figure indicating what the figure shows.	Perpetua, 12 pt; italic; centered; single line spacing ( <i>Note: If more than one line is required the caption shall be flushed left.</i> )
<b>HiG Lista</b>	A bullet list, independent whether the symbol is a bullet, letter or digit.	Perpetua, 13 pt; flush left; single line spacing; indented 0,63 cm
<b>HiG Rubrik 1</b>	The highest heading level, used for main chapters, such as Preface, Abstract and References (without numbering) and for all "IMRAD-headings" with numbers 1, 2 etc.	Verdana, 14 pt; bold; flush left; 12 pt line spacing after; page break before (i.e. will <i>always</i> start on a new page)
<b>HiG Rubrik 2</b>	The first subsection level below HiG Rubrik 1. Used to divide the text into logical sections. Numbering is made according to "Main section.Subsection", 1.1; 1.2 and so on.	Verdana, 12 pt; bold; flush left; 18 pt line spacing before; 6 pt line spacing after
<b>HiG Rubrik 3</b>	Used to divide subsections text into logical sections, Numbered e.g. 1.1.2 or 3.1.1.	Perpetua, 13 pt; bold; flush left; 12 pt line spacing before; 6 pt line spacing after
<b>HiG Rubrik 4</b>	Normally not used but might be applied should need arise to structure level 3 into logical subsections. Numbered as 3.1.2.2. Will not appear in the Table of Contents.	Perpetua, 12 pt; underlined; flush left; 6 pt line spacing before; 6 pt line spacing after
<b>HiG Tabellbeskrivning</b>	The caption text located above each table describing the content of the table.	Perpetua, 12 pt; italic; centered; single line spacing ( <i>Note: If more than one line is required the caption shall be flushed left.</i> )
<b>HiG Tabelltext</b>	The actual table content.	Perpetua, 12 pt; headings made bold

When referring to a figure from the text body it is always done using “Fig.” and the number. Examples of how to refer to a figure are:

- “In Fig. 4 it is clearly shown that...”
- “... when comparing Fig. 5 and Fig. 6 it can be seen that...”

Should a sentence begin with a figure reference the full word is written out like this: “Figure 1 shows ...”



*Figure 1. The inventor of electronics [2].*

After some spacing from the figure caption (one blank line is usually sufficient), the running text may proceed. In Fig. 2, the most famous result of the genius in Fig. 1 is given. The result is commonly used to be called a transistor, but is really a radio [2]. (Notice that reference [2] is given once again, because this is a new statement.)

Tables, just as with figures, must have a numbered caption describing the content of the table. Furthermore, they must be referred to from the text, e.g. by writing “see Tab. 2”, or similar; and, as with figures, the full word table is only spelled out in the beginning of a sentence like this: “Table 1 shows ...”.

Figures and tables have in common that they:

- must have a caption containing enough information for the reader to understand the content of the figure/table, without reading the surrounding text,
- must be referred to from the text, and
- must be described/referred to in a preceding paragraph to not confuse the reader when a figure/table appears without previously being mentioned.

What separates them is that the caption of a figure always is located **below** the figure while the caption of a table always is located **above** the table.

### **1.3 Finally...**

Do not forget that the Introduction is supposed to intrigue the reader to continue the reading. A badly written Introduction has in many cases been the reason to make unknown results (although interesting and useful) remaining unknown. For this reason, it is important to conclude the Introduction in an appealing fashion.



*Figure 2. “Transistor” was the nickname of the transistor based radio during the 1960s and 1970s [2]. (Note that reference [2] appears again— since we here bring forward a new statement, based on the same reference; however, not really connected to the previous statement.)*

*(Well this didn't look nice! To end the section with a figure alone on a page is not good. Try to rearrange when this happens.)*

## 2 Theory

Here the text may include figures, tables, equations – you name it! However, tedious mathematics of no immediate need for the understanding of the theory may be left behind. If there is a stand-alone value of mathematical reasoning or other similar proof, such material may be put in one or several Appendix sections. At an appropriate place in the running text or close to a resulting equation, a reference to the proof or mathematical elaboration is given, see Appendix A.

The useful equation/-s, however, should be given in the Theory. If many equations are used they may be numbered in a number series of their own with no relation to chapter numbers. Equations are referred to in the same way as references although with round brackets. In (1) we can see the transfer function of a low-pass filter [3]. Do not forget to give explanations to all symbols in the equations.

$$\frac{v_{out}}{v_{in}} = \frac{1}{1 + j\frac{\omega}{\omega_1}} \quad (1)$$

$$\omega = 2\pi f \quad (2)$$

$$\tau = \frac{1}{t} = \frac{1}{RC} \quad (3)$$

where  $v_{out}$  = output signal  
 $v_{in}$  = input signal  
 $\omega$  = signal angular velocity  
 $f$  = signal frequency  
 $\tau$  = the system time constant  
 $R$  = resistance of the circuit  
 $C$  = capacitance of the circuit

It may be a good idea to specify the given theory with some graphics, see Fig. 3. In Fig. 3, a schematic view of the system is shown, although you have taken it from another source [3]. It is normal that the figure and the equations belong to the same reference.

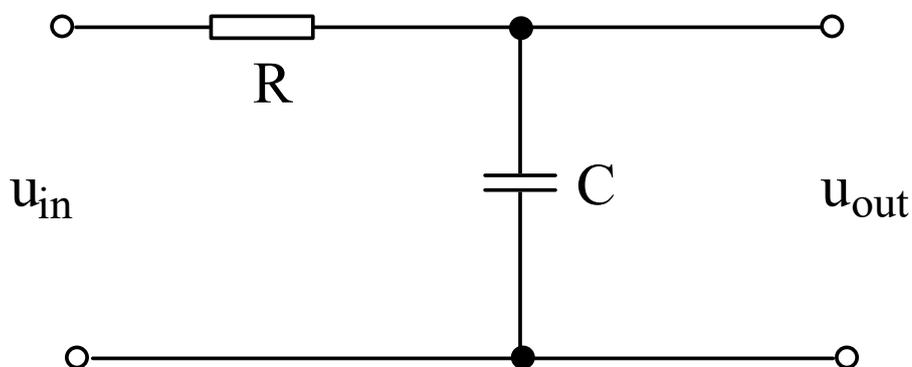


Figure 3. System view [3]. Notice that the figure number is not related to the chapter number.

Sometimes a longer quotation may be justified to inform the reader of something a person has said or to include a definition made by someone else, as the below introduction to Bayesian Parameter Estimation given in [3]:

*“...we assume as a model a family of distributions for the random observation  $Y$ , indexed by the parameter  $\theta$  taking values in a parameter set  $\mathcal{A}$ ; i.e., we have the family  $\{P_\theta; \theta \in \mathcal{A}\}$ , where  $P_\theta$  denotes a distribution on the observation space  $(\Gamma, \mathcal{G})$ . We also assume that the parameter set is a subset of  $\mathbb{R}^m$  for some  $m$ ...”*

This kind of block quotation should be

- a) marked clearly to not be mistaken for your own thoughts and
- b) avoided as far as possible.

NB! Sometimes it is important to show someone else's ideas/statements or similar, then it is imperative to follow a).

### 3 Process and results

Here the theory is applied on the subject, i.e. you describe what you have done, how you did it, and what results are. The results are presented in an objective and neutral way. Discussions and value-laden words belongs to Chapter 4.

As in all good reports the results are illustrated with tables and diagrams or graphs. Tables are numbered in a number series of their own, but diagrams and graphs are denoted as figures and, if appearing the numbering is continuing the previously appearing series. Notice that previous subsections have to be named properly according to their respective contents.

#### 3.1 First Subsection – HiG-rubrik 2

So, let us go to some results. The main system, according to Eq. (1) and Fig. 3, may have an output as in Fig. 4. In this case, the results given are original work by the author. Hence, there is no need for referencing, neither here nor in the figure caption.

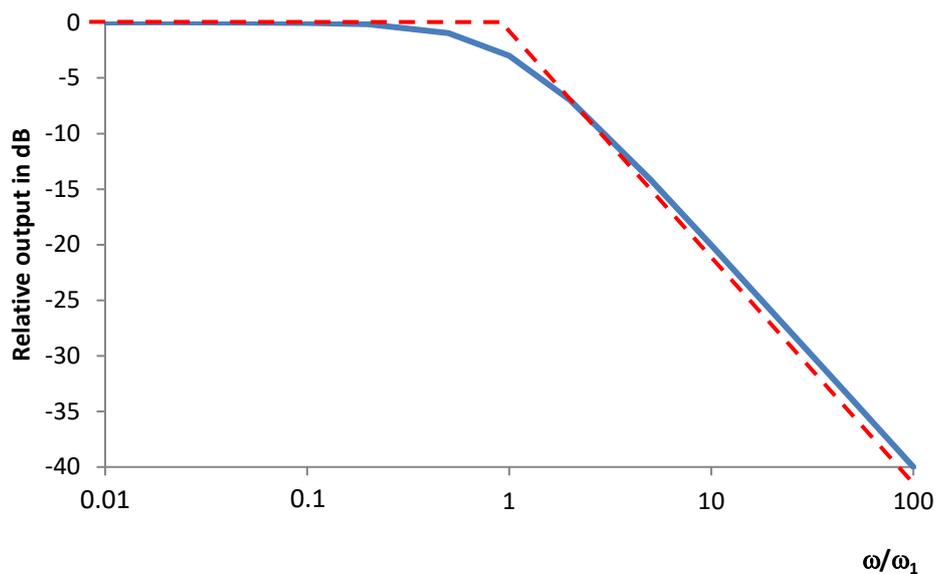


Figure 4. System characteristics of a first-order low-pass filter. Measured values (blue, solid line), asymptotic approximation (red, dashed line). Also, note that when the figure caption is longer than one line it is not centered below the figure, but instead left-aligned.

However, if the result shown in Fig. 4 for some reason is taken from another source, i.e., not original work by the author, a reference has to be given.

### 3.1.1 2<sup>nd</sup> level Subsection – HiG-rubrik 3

It is not necessary to have subsections in the report. However, if you feel as an author that subsections would spice up the report, not more than two levels of subsection should be used. More levels than that would only confuse the reader, and make him/her lose focus. However, in order to elaborate on the system discussed in Section 3.1, some data would seem appropriate. Data may be shown in a Table. Now, since this is the first table to be presented in the report, the data is given in Tab. 2. The Table caption is given *above* the actual table.

Table 2. Data acquired from measurements on the system shown in Fig. 3.

Frequency (Hz)	Normalized system response	Phase response (degrees)
0	10.0	0.0
10	9.999957137	-0.179999408
20	9.999828551	-0.359995263
30	9.999614249	-0.539984012
40	9.999314244	-0.719962104
50	9.998928553	-0.899925989
60	9.998457201	-1.079872117
70	9.997900213	-1.259796942
80	9.997257625	-1.439696921
90	9.996529472	-1.61956851
100	9.995715799	-1.799408174
110	9.994816654	-1.979212378
120	9.993832089	-2.158977591
130	9.992762163	-2.338700289
140	9.991606938	-2.518376952
150	9.990366484	-2.698004064
160	9.989040873	-2.877578116

Well, in reality Tab. 2 is pretty much larger than the one shown above, but right here and now we do not need to show the complete table. This is just taken as an example of a Table.

## 4 Discussion

In this chapter the results and the chosen method are discussed, as well as the strengths and weaknesses of the work.

As you probably already have noticed, this document is of low scientific level and contains a lot of nonsense. The results of this report are not qualifying for any degree – not at the University of Gävle anyway. The method used in this report is inductive, and the main idea is to give you a feeling of how to write a report in a proper way. Let us hope that this intension is fruitful and the examples are adopted well.

A clear weakness of this work is that the references used are not at all relevant. On the other hand, why should they be? This is merely a template document that illustrates the elements of a thesis as it is supposed to be written in the Faculty of Engineering and Sustainable Development at the University of Gävle. In this example the references were just given to show the IEEE standard of referencing. Consult *Your* examiner or supervisor regarding which referencing style to use within your field of studies.

A much more serious thing is that all references in the reference list were not used, cf. References a few sections ahead. This is absolutely forbidden!

*All references listed have to be used in the running text, figure captions, table captions etc., and all references appearing in the report (running text, figure captions, table captions etc.) have to be presented in the reference list.*

**NOTE!** Since 2017 it is mandatory that all technical reports, theses, and similar publications, discuss Environmental Impact and Sustainability of the project.

To find a starting point it is suggested to use “the United Nations’ 2030 Agenda for Sustainable Development” and its 17 Sustainable Development Goals ([www.un.org/sustainabledevelopment/development-agenda](http://www.un.org/sustainabledevelopment/development-agenda)). Under each goal there are some goal targets listed.

Identify one or more goals relevant for your thesis, and comment using relevant goal targets.

**NOTE!** A thesis written at HiG-ATM cannot be approved unless its environmental impact and sustainability has been addressed!

**Delete this text box before publishing your thesis!**

## 5 Conclusions

Here the work should be concluded and the major results presented. Suggestions of continuation and spin-off projects **may** be brought forward, usually under a separate subsection called “Future Work”.

## References

Please ask your academic supervisor or examiner which system to use since this varies between different disciplines. As an example, within the computer science, and the electrical and electronics engineering disciplines the IEEE referencing system is used.

To get some assistance in reference writing (i.e. formatting) it is quite convenient to browse the internet. A computer science or electrical engineering student may look for the **official reference guide of the IEEE: "IEEE Citation Reference"** (which may be a bit rigid in the format) or by using search terms like e.g. "IEEE citation style" to find good on-line guides, and even reference generating tools (e.g. RefME.com) where you enter the type of reference (book, scientific article...) title, author etc. and the tool returns a correctly formatted reference.

A comprehensive and easy to use guide, "Citing and referencing - Library Guides at Monash University", may be found at ([guides.lib.monash.edu/citing-referencing](http://guides.lib.monash.edu/citing-referencing)).

**NOTE!** A reference may not be listed here unless it is used and cited in the thesis!

**Delete this text box before publishing your thesis!**

Below is an example of an IEEE style reference list (The text within brackets is there for information only and should not be included in the real reference list):

- [1] G. O. Young, "Synthetic structure of industrial plastics (Book style with paper title and editor)," in *Plastics*, 2nd ed. vol. 3, J. Peters, Ed. New York: McGraw-Hill, 1964, pp. 15–64.
- [2] W.-K. Chen, *Linear Networks and Systems* (Book style). Belmont, CA: Wadsworth, 1993, pp. 123–135.
- [3] H. Poor, *An Introduction to Signal Detection and Estimation*. New York: Springer-Verlag, 1985, ch. 4.
- [4] B. Smith, "An approach to graphs of linear forms (Unpublished work style)," unpublished.
- [5] E. H. Miller, "A note on reflector arrays (Periodical style—Accepted for publication)," *IEEE Trans. Antennas Propagat.*, to be published.
- [6] J. Wang, "Fundamentals of erbium-doped fiber amplifiers arrays (Periodical style—Submitted for publication)," *IEEE J. Quantum Electron.*, submitted for publication.
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- [23] R. E. Haskell and C. T. Case, "Transient signal propagation in lossless isotropic plasmas (Report style)," USAF Cambridge Res. Lab., Cambridge, MA Rep. ARCRL-66-234 (II), 1994, vol. 2.
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- [30] R. J. Vidmar. (1992, August). On the use of atmospheric plasmas as electromagnetic reflectors. *IEEE Trans. Plasma Sci.* [Online]. 21(3). pp. 876—880. Available: <http://www.halcyon.com/pub/journals/21ps03-vidmar>

## Appendix A

In the appendices, material is placed which is not needed for the immediate comprehension of the work. For example, the following is preferably placed in an appendix:

- extensive calculations
- derivations
- computer programs
- data listing
- large circuit diagrams
- photographs (if they by number interfere with the readability)
- interview forms
- questionnaires
- etc

Note that the above list is by no means exhaustive, if you have something else that takes a lot of space and/or interferes with the reading of your text, it should be placed in an appendix.

Appendices are treated as documents of their own, which implies that figures and tables are numbered in a new series in each appendix, starting with 1, i.e. Fig. 1, Table 1 och (1).

## **Appendix B**

If needed.

## **Appendix C**

If needed.