

Notes on 3rd cycle version of the template

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September 2025

This document is a work in progress.

This document describes the third-cycle version of the thesis template I have developed for use at KTH Royal Institute of Technology (KTH). This version was developed based on an examination of the thesis template “Avhandlingsmall Word” from <https://www.kth.se/student/studier/examensarbete/avhandlingarochexamensarbeten/mall-for-avhandling-1.458236> [hereafter referred to as the AW-template]. My new template is designed to overcome many of what I view as deficiencies of the AW-template*.

*Note that my referring to them as deficiencies is my own personal view of certain features (or lack thereof) of the AW-template and should **not** be taken as *personal criticism of those who were involved in the creation of the AW-template*, but rather should be viewed as constructive criticism that hopefully can be used to improve the AW-template or other similar efforts.

2 | Notes on 3rd cycle version of the template

Contents

1	Deficiencies	5
2	Deeper dive into the AW-template	8
2.1	Page size and some units used in OOXML	8
2.2	Page margins	9
2.3	Fonts	10
2.3.1	Figtree	10
2.3.2	Georgia	10
2.3.3	Additional Fonts in the AW-template	11
2.3.4	Need for a different choice of fonts	11
2.3.5	Use of fonts within the thesis	33
2.3.6	Mapping unicode characters to fonts	39
2.4	Headings	50
2.4.1	For testing	51
2.4.1.1	For testing	51
3	Cover	52
3.1	Type of thesis	52
3.1.1	Uncertainty about type of thesis in Swedish	53
3.1.2	Uncertainty about the names of doctoral degrees	54
3.2	Title, Subtitle, and Author's name	55
3.3	Name of institution under author's name	55
3.4	Cover illustration	57
3.4.1	Cover images and figures	57
3.4.2	Draw and make your own cover illustration in L ^A T _E X	60
4	Title page	60
5	Book info page	61
6	Back Cover	62
7	Abstracts and keywords	62
7.1	Language and font usage in Abstracts	63
7.2	Keywords in Abstracts	65
7.3	Tables and images in abstracts	65
7.4	Graphical or visual abstracts	66

8	Table of contents and its placement	66
9	The List of Figures, List of Tables, Listings, etc.	67
10	List of acronyms and abbreviations	68
11	List of Symbols Used	68
12	List of publications	69
13	Chapters within the thesis	70
14	Paragraph formatting within the thesis body	70
15	References	70
16	Appendices	71
17	Included papers	71
18	Divider pages	71
	18.1 How to make divider pages	72
19	Writing additional files	75
20	Posting	77
	References	78

1 Deficiencies

I believe that these deficiencies include (but are *not* limited to) the following:

- ✗ The AW-template lacks a cover or a title page - so the reader will **not** know the title of this document from its contents.
- ✗ There is no backside of the title page - so the student cannot easily specify a copyright or choose to use one of the Creative Commons licenses* nor specify the International Standard Book Number (ISBN) and TRITA numbers.
- ✗ The AW-template does not address the question of abstracts in languages other than English and Swedish. There is no reason to limit the thesis to having abstracts in only Swedish and English. As can be seen in Digitala Vetenskapliga Arkivet (DiVA) there are a variety of languages used for abstracts in addition to English and Swedish[†].
- ✗ The choice of the font used for Heading 1 on the "Abstract" page is Figtree Medium 24 pt. Unfortunately, Figtree does not support Greek - characters, so a student would not be able to have "Περίληψη" to indicate an abstract in the Greek language. There are similar problems for other languages that use characters that are not included in Figtree. Note that this same problem occurs when using Figtree in the other levels of headings and the title and subtitle (if there were to be a cover or title page).

*Interestingly, KI requires that the thesis is published electronically in KI Open Archive under a Creative Commons license, for example CC-BY9. - see §7.2.8 Public notification – "nailing" on page 23 of *Rules for doctoral education at Karolinska Institutet*, <https://staff.ki.se/media/1742/download> and *Policy for open publication at Karolinska Institutet* <https://staff.ki.se/research-support/policy-for-open-publication-at-karolinska-institutet>

[†]In DiVA there are abstracts in the following language codes: alb, ara, cat, chi, dan, dut, eng, fin, fre, ger, gre, heb, hin, hun, ice, ita, jpn, kur, lat, lav, nor, pol, por, rum, rus, scc, slo, spa, swa, swe, tur, ukr, und, and vie. Additionally, there are keywords in the following language codes: ara, cat, chi, dut, eng, fin, fre, ger, gre, hun, ice, ita, lat, lav, nor, per, pol, por, rum, rus, scc, slo, spa, swa, swe, tur, and ukr.

6 | Deficiencies

- ✗ The abstract pages (and other preface pages) lack a page number, which would generally be a lowercase Roman numeral, i.e., i, ii, iii, iv, etc.
- ✗ There seems to be nothing done to make it easy to mechanically collect the abstracts for input to DiVA, the National Subject Category information, the UN's Sustainable Development Goals (SDGs) information, or other data that is needed for the DiVA entry for input to DiVA. This other data includes information about the author(s) and supervisors.
- ✗ The acknowledgments page seems to be missing the so-called “acknowledgments signature” with the place, date, and author's name.
- ✗ I would have expected the Table of Contents *before* the List of Figures; List of Tables, Listings, Acronyms and Abbreviations; List of Symbols Used (aka Nomenclature); and List of Publications. Note that some of these pages (while optional) are missing from the AW-template.
- ✗ The “List of Publications” page in the AW-template seems to only consider peer-reviewed articles and scientific papers, and seems to ignore patents, patent applications, data sets, and other material that may have previously been published and be included as part of this thesis.
- ✗ The “List of Publications” page says that the titles of the publications are to be set in Figtree; however, this may not be possible as Figtree lacks Greek characters, math symbols, etc., that may appear in the titles.
- ✗ There is a similar problem with the Figtree font for the “List of Abbreviations”.
- ✗ The examples of figures show figures that lack sufficient contrast to be clearly readable and represent poor visual presentations of data (for example, the figure is missing labels for the axes, labels above the bars, scale, etc.).
- ✗ The examples of tables show the use of numeric values set in Georgia Bold - which is **not** a fixed-width font, so numeric values will not nicely align vertically, making it more difficult for the reader to compare the values. Additionally, using the percentage symbol following each number when the row heading says “Percentage” is both redundant and confusing.

- ✗ The footnote shown on the “Results” page shows the use of numeric footnotes – this is generally a very poor choice in scientific and engineering theses as these numeric superscripts can be confused with exponents, such as 10^2 or 10^4 and 1 m^3 or 1 m^2 . It is much better to use symbols (such as dagger, double dagger, etc.) and restart the symbols on each page.
- ✗ The “Conclusions” chapter seems to be missing a subheading that addresses future work. It probably should also have a subheading of “Reflections on Ethical and Sustainability Issues” – to be in keeping with the aim to identify these issues and clarify which were actually thought about. [In some cases, this is done earlier in the thesis – but should be addressed somewhere.] **NB** DiVA includes fields for listing which UN SDG goals a thesis contributes to.
- ✗ The format of the references (APA) shown is quite uncommon in theses outside of psychology and medicine – it will also make it very hard to find a given reference among possibly hundreds of cited references. [see, for example, <https://urn.kb.se/resolve?urn=urn%3Anbn%3Ase%3Akth%3Adiva-355029>] Moreover, by not encouraging the use of ISBNs, DOIs, URLs, etc. in the references (when they are relevant) makes the reader’s job much harder when they want to access the actual reference. This also makes it much harder for tools to extract references and use them when reference counting.
- ✗ The example of a “Points of perspective” chapter seems very odd and would be very unusual in a technical thesis, but is found in the description of a compilation thesis at Karolinska Institutet (KI) (see <https://staff.ki.se/doctoral-education/time-to-defend-your-thesis/content-of-the-thesis>).
- ✗ The AW-template does not give an example of how to include and number the appendices.
- ✗ The AW-template provides no actual guidance on how to add the tabbed pages before each of the included publications (that, in some cases, must include specific citations in order to satisfy the copyright holder’s required statement when the document is republished in the thesis).

- ✗ While the AW-template shows how one can include English and Swedish keywords, there is a need to support titles (and subtitles) in at least English and Swedish*.

The above are my personal comments based on my looking at the AW-template in more detail on 2025-04-04 and 2025-05-23. I had given some comments earlier via e-mail and in meetings of the språkkommittén. The aim of my comments is to be constructive. Additionally, I wanted to be able to translate the Microsoft Word Open XML Document (DOCX) file into a \LaTeX template. Moreover, I hope that my template addresses the above deficiencies and will better support the needs of the author(s), supervisors, and different readers (and other users).

2 Deeper dive into the AW-template

To get more information about the details of the AW-template, I copied the DOCX file to a ZIP file and examined the Extensible Markup Language (XML) files. DOCX files, as generated with Microsoft Office, utilize ISO/IEC-29500 Office Open XML File Formats (OOXML) [1]. When reading the OOXML files, one needs to understand some details of this format,

2.1 Page size and some units used in OOXML

The document.xml file says that the page size is:

```
<w:pgSz w:w="11907" w:h="16840" w:code="9" />
```

The page size is specified in twentieth of a point (*i.e.*, dxa), thus this corresponds to 210.026 25 mm \times 297.038 889 mm or 595.35 PostScript points \times 842 PostScript points - *i.e.*, an ISO 216 A4 page (this also seems to be the meaning of w:code=9). The dxa unit is used to specify page dimensions, margins, tabs, etc. While the number of significant digits is a bit excessive in the floating-point numbers shown above, the internal units used by Microsoft's Word are all integers.

An additional unit is “half-points”. This unit is used to specify font sizes; therefore, a font size of 12pt equals 24 half points.

*In the case of my \LaTeX template, I have used the “subject” PDF document property to show the alternative title (for example, the Swedish title if the document's title is in English). In this way, when you open a document, you can quickly see in the document's properties the English and Swedish titles.

When specifying tables, one can use a relative measurement unit called “fiftieths of a Percent” (with the type “pct”).

Yet another unit is English Metric Units (EMUs) - with one inch being 914 400 EMUs or a centimeter being 360 000 EMUs. This unit is used in vector drawings.

NB The AW-template should note that it is designed for printing on an A4 page, even though the thesis will be printed in G5 size (169 mm × 239 mm.)

2.2 Page margins

The page margins (shown in Table 1) are specified as:

```
<w:pgMar w:top="2041" w:right="1247" w:bottom="1701"
  ↪ w:left="2438" w:header="567" w:footer="567"
  ↪ w:gutter="0"/>
```

Table 1: Page margins

Margin	dxa	millimeters
top margin	2 041	36.001
right margin	1 247	21.996
bottom margin	1 701	30.004
left margin	2 438	43.004
header margin	567	10.001
footer margin	567	10.001

Based on the above, I slightly adjusted the top, bottom, inner, and outer margins with:

```
\RequirePackage[a4paper,twoside,
  top=36mm,bottom=30mm,inner=43mm,outer=22mm,
  headsep=15mm,headheight=6mm,footskip=25mm]{geometry} %
  ↪ Set paper and contents dimensions
```

2.3 Fonts

The AW-template has selected Figtree as a sans serif font for headings and much of the front matter and selected Georgia as the serif font for the body of the thesis. More specifically, Figtree Medium, Figtree Bold, Figtree SemiBold, and Figtree (aka Figtree Regular) are used along with the serif fonts: Georgia, Georgia Pro, Georgia Italics, and Georgia Bold. See Section 2.3.3 for a note about the use (or non-use) of Georgia Pro.

2.3.1 Figtree

One can get the Figtree font from <https://fonts.google.com/specimen/Figtree> and then install it (following the directions for your operating system (OS) - see the `README.txt` included with the font). There are two versions of the font: (i) static and (ii) variable. At the time of my download in Spring 2025, there are 14 static font faces in the Figtree font: Light, Light Italic, Regular, Italic, Medium, Medium Italic, SemiBold, SemiBold Italic, Bold, Bold Italic, ExtraBold, ExtraBold Italic, Black, and Black Italic. Note that there is no small caps font in the download. The font itself is licensed under the SIL Open Font License, Version 1.1, see <https://fonts.google.com/specimen/Figtree/license>.

NB If you are using Word and you have **not** installed the Figtree font, then saving the file as PDF will utilize Calibri rather than Figtree!

As Figtree does not have a small caps font, Word sets the small caps as caps but in a smaller font. For example, for a `Heading 6` in the AW-template - the caps are 12pt*, while the imitated small caps are caps set at 9.48pt. This would appear to be a scaling by a factor of 0.79.

2.3.2 Georgia

Microsoft's Georgia is a serif typeface, see <https://learn.microsoft.com/en-us/typography/font-list/georgia>. I would suggest that instead of using a proprietary font, one should use a freely available serif font, such as TeX Gyre Termes.

*In this document, I have used the traditional typographic convention of writing the number *without* a space between the number and the unit ("pt") - as the "pt" is considered part of the font size. However, when points is spelled out, then I will proceed it with a space.

2.3.3 Additional Fonts in the AW-template

In the AW-template, there are some additional fonts used:

1. In the AW-template, Georgia Pro is used as the font for the default paragraph style and in the paragraph styles for “Publisher” and “EndnoteReference”.
2. DM Sans - is indicated as the default document font and in the paragraph styles: “Kursiverat” and “Romerskaseparatlista”;
3. Tahoma - is used in the “Balloon Text” paragraph style

Note that Georgia Pro is the original version of Georgia - it is separately licensed by Microsoft. I would suggest that if these paragraph styles are needed, one should use a freely available serif font. Note that no examples are given in the AW-template that use either of these paragraph styles.

The DM Sans font is available from <https://fonts.google.com/specimen/DM+Sans> and licensed under SIL Open Font License, Version 1.1, see <https://fonts.google.com/specimen/DM+Sans/license>. This font is a sans serif font designed for use for smaller text. I would suggest that if these paragraph styles are needed, one could use a freely available sans serif font in the font size of the body text. It is unclear why you would utilize (yet) another sans serif font for these paragraph styles. Note that no examples are given in the AW-template that use these paragraph styles.

Tahoma is one of Microsoft’s sans serif typefaces. For details and a link to the font licensing site, see <https://learn.microsoft.com/en-us/typography/font-list/tahoma>. As this is a proprietary font, I have not used it anywhere in this template. I would suggest that if this paragraph style is needed, one could use a freely available sans serif font. Note that no examples are given in the AW-template that use this paragraph style.

2.3.4 Need for a different choice of fonts

I complained a long time ago* about the choice of Figtree versus a font such as Noto, based on the fact that Figtree does not support the set of characters that have actually been used in English and Swedish thesis titles and subtitles at KTH. I was easily able to compute which characters were unsupported for the titles and subtitles by looking at the actual titles and subtitles from DiVA using a Jupyter

*When it was first revealed that Figtree had been chosen as the sans serif font.

notebook with the code snippet shown in Listing 1*. Part of the output is shown in Listings 2 to 6. Unfortunately, there has been no change in the selection of the sans serif font.

Listing 1: A python code snippet looking a Figtree as a possible font by using DiVA data about titles and subtitles. The glyphs in Figtree and some manual additions of characters that occurred in titles and subtitles.

```
figtree_characters=["\u0020", # space
"\u0021", # exclam
"\u0022", # quotedbl
"\u0023", # numbersign
"\u0024", # dollar
"\u0025", # percent
"\u0026", # ampersand
"\u0027", # quotesingle
"\u0028", # parenleft
"\u0029", # parenright
"\u002a", # asterisk
"\u002b", # plus
"\u002c", # comma
"\u002d", # hyphen
"\u002e", # period
"\u002f", # slash
"\u0030", # zero
"\u0031", # one
"\u0032", # two
"\u0033", # three
"\u0034", # four
"\u0035", # five
"\u0036", # six
"\u0037", # seven
"\u0038", # eight
"\u0039", # nine
"\u003a", # colon
"\u003b", # semicolon
"\u003c", # less
"\u003d", # equal
"\u003e", # greater
```

*The complete notebook that gets data from a DiVA MODS format feed and makes a panda dataframe is available on request.

```
"\u003f", # question
"\u0040", # at
"\u0041", # A
"\u0042", # B
"\u0043", # C
"\u0044", # D
"\u0045", # E
"\u0046", # F
"\u0047", # G
"\u0048", # H
"\u0049", # I
"\u004a", # J
"\u004b", # K
"\u004c", # L
"\u004d", # M
"\u004e", # N
"\u004f", # O
"\u0050", # P
"\u0051", # Q
"\u0052", # R
"\u0053", # S
"\u0054", # T
"\u0055", # U
"\u0056", # V
"\u0057", # W
"\u0058", # X
"\u0059", # Y
"\u005a", # Z
"\u005b", # bracketleft
"\u005c", # backslash
"\u005d", # bracketright
"\u005e", # asciicircum
"\u005f", # underscore
"\u0060", # grave
"\u0061", # a
"\u0062", # b
"\u0063", # c
"\u0064", # d
"\u0065", # e
"\u0066", # f
```

14 | Deeper dive into the AW-template

```
"\u0067", # g
"\u0068", # h
"\u0069", # i
"\u006a", # j
"\u006b", # k
"\u006c", # l
"\u006d", # m
"\u006e", # n
"\u006f", # o
"\u0070", # p
"\u0071", # q
"\u0072", # r
"\u0073", # s
"\u0074", # t
"\u0075", # u
"\u0076", # v
"\u0077", # w
"\u0078", # x
"\u0079", # y
"\u007a", # z
"\u007b", # braceleft
"\u007c", # bar
"\u007d", # braceright
"\u007e", # asciitilde
"\u00a0", # uni00A0
"\u00a1", # exclamdown
"\u00a2", # cent
"\u00a3", # sterling
"\u00a4", # currency
"\u00a5", # yen
"\u00a6", # brokenbar
"\u00a7", # section
"\u00a8", # dieresis
"\u00a9", # copyright
"\u00aa", # ordfeminine
"\u00ab", # guillemotleft
"\u00ac", # logicalnot
"\u00ae", # registered
"\u00af", # macron
"\u00b0", # degree
```

```
"\u00b1", # plusminus
"\u00b2", # uni00B2
"\u00b3", # uni00B3
"\u00b4", # acute
"\u00b5", # uni00B5
"\u00b6", # paragraph
"\u00b7", # periodcentered
"\u00b8", # cedilla
"\u00b9", # uni00B9
"\u00ba", # ordmasculine
"\u00bb", # guillemotright
"\u00bc", # onequarter
"\u00bd", # onehalf
"\u00be", # threequarters
"\u00bf", # questiondown
"\u00c0", # Agrave
"\u00c1", # Aacute
"\u00c2", # Acircumflex
"\u00c3", # Atilde
"\u00c4", # Adieresis
"\u00c5", # Aring
"\u00c6", # AE
"\u00c7", # Ccedilla
"\u00c8", # Egrave
"\u00c9", # Eacute
"\u00ca", # Ecircumflex
"\u00cb", # Edieresis
"\u00cc", # Igrave
"\u00cd", # Iacute
"\u00ce", # Icircumflex
"\u00cf", # Idieresis
"\u00d0", # Eth
"\u00d1", # Ntilde
"\u00d2", # Ograve
"\u00d3", # Oacute
"\u00d4", # Ocircumflex
"\u00d5", # Otilde
"\u00d6", # Odieresis
"\u00d7", # multiply
"\u00d8", # Oslash
```

16 | Deeper dive into the AW-template

```
"\u00d9", # Ugrave
"\u00da", # Uacute
"\u00db", # Ucircumflex
"\u00dc", # Udieresis
"\u00dd", # Yacute
"\u00de", # Thorn
"\u00df", # germandbls
"\u00e0", # agrave
"\u00e1", # aacute
"\u00e2", # acircumflex
"\u00e3", # atilde
"\u00e4", # adieresis
"\u00e5", # aring
"\u00e6", # ae
"\u00e7", # ccedilla
"\u00e8", # egrave
"\u00e9", # eacute
"\u00ea", # ecircumflex
"\u00eb", # edieresis
"\u00ec", # igrave
"\u00ed", # iacute
"\u00ee", # icircumflex
"\u00ef", # idieresis
"\u00f0", # eth
"\u00f1", # ntilde
"\u00f2", # ograve
"\u00f3", # oacute
"\u00f4", # ocircumflex
"\u00f5", # otilde
"\u00f6", # odieresis
"\u00f7", # divide
"\u00f8", # oslash
"\u00f9", # ugrave
"\u00fa", # uacute
"\u00fb", # ucircumflex
"\u00fc", # udieresis
"\u00fd", # yacute
"\u00fe", # thorn
"\u00ff", # ydieresis
"\u0100", # Amacron
```



```
"\u0101", # amacron
"\u0102", # Abreve
"\u0103", # abreve
"\u0104", # Aogonek
"\u0105", # aogonek
"\u0106", # Cacute
"\u0107", # cacute
"\u0108", # Ccircumflex
"\u0109", # ccircumflex
"\u010a", # Cdotaccent
"\u010b", # cdotaccent
"\u010c", # Ccaron
"\u010d", # ccaron
"\u010e", # Dcaron
"\u010f", # dcaron
"\u0110", # Dcroat
"\u0111", # dcroat
"\u0112", # Emacron
"\u0113", # emacron
"\u0116", # Edotaccent
"\u0117", # edotaccent
"\u0118", # Eogonek
"\u0119", # eogonek
"\u011a", # Ecaron
"\u011b", # ecaron
"\u011c", # Gcircumflex
"\u011d", # gcircumflex
"\u011e", # Gbreve
"\u011f", # gbreve
"\u0120", # Gdotaccent
"\u0121", # gdotaccent
"\u0122", # uni0122
"\u0123", # uni0123
"\u0124", # Hcircumflex
"\u0125", # hcircumflex
"\u0126", # Hbar
"\u0127", # hbar
"\u012a", # Imacron
"\u012b", # imacron
"\u012e", # Iogonek
```

18 | Deeper dive into the AW-template

```
"\u012f", # iogonek
"\u0130", # Idotaccent
"\u0131", # dotlessi
"\u0132", # IJ
"\u0133", # ij
"\u0134", # Jcircumflex
"\u0135", # jcircumflex
"\u0136", # uni0136
"\u0137", # uni0137
"\u0139", # Lacute
"\u013a", # lacute
"\u013b", # uni013B
"\u013c", # uni013C
"\u013d", # Lcaron
"\u013e", # lcaron
"\u0141", # Lslash
"\u0142", # lslash
"\u0143", # Nacute
"\u0144", # nacute
"\u0145", # uni0145
"\u0146", # uni0146
"\u0147", # Ncaron
"\u0148", # ncaron
"\u014a", # Eng
"\u014b", # eng
"\u014c", # Omacron
"\u014d", # omacron
"\u0150", # Ohungarumlaut
"\u0151", # ohungarumlaut
"\u0152", # OE
"\u0153", # oe
"\u0154", # Racute
"\u0155", # racute
"\u0156", # uni0156
"\u0157", # uni0157
"\u0158", # Rcaron
"\u0159", # rcaron
"\u015a", # Sacute
"\u015b", # sacute
"\u015c", # Scircumflex
```

```
"\u015d", # scircumflex
"\u015e", # Scedilla
"\u015f", # scedilla
"\u0160", # Scaron
"\u0161", # scaron
"\u0164", # Tcaron
"\u0165", # tcaron
"\u016a", # Umacron
"\u016b", # umacron
"\u016c", # Ubreve
"\u016d", # ubreve
"\u016e", # Uring
"\u016f", # uring
"\u0170", # Uhungarumlaut
"\u0171", # uhungarumlaut
"\u0172", # Uogonek
"\u0173", # uogonek
"\u0174", # Wcircumflex
"\u0175", # wcircumflex
"\u0176", # Ycircumflex
"\u0177", # ycircumflex
"\u0178", # Ydieresis
"\u0179", # Zacute
"\u017a", # zacute
"\u017b", # Zdotaccent
"\u017c", # zdotaccent
"\u017d", # Zcaron
"\u017e", # zcaron
"\u01cd", # uni01CD
"\u01ce", # uni01CE
"\u0218", # uni0218
"\u0219", # uni0219
"\u021a", # uni021A
"\u021b", # uni021B
"\u0237", # uni0237
"\u02c6", # circumflex
"\u02c7", # caron
"\u02d8", # breve
"\u02d9", # dotaccent
"\u02da", # ring
```

20 | Deeper dive into the AW-template

```
"\u02db", # ogonek
"\u02dc", # tilde
"\u02dd", # hungarumlaut
"\u0300", # gravecomb
"\u0301", # acutecomb
"\u0302", # uni0302
"\u0303", # tildecomb
"\u0304", # uni0304
"\u0306", # uni0306
"\u0307", # uni0307
"\u0308", # uni0308
"\u030a", # uni030A
"\u030b", # uni030B
"\u030c", # uni030C
"\u0312", # uni0312
"\u0326", # uni0326
"\u0327", # uni0327
"\u0328", # uni0328
"\ule80", # Wgrave
"\ule81", # wgrave
"\ule82", # Wacute
"\ule83", # wacute
"\ule84", # Wdieresis
"\ule85", # wdieresis
"\ule9e", # unilE9E
"\ulef2", # Ygrave
"\ulef3", # ygrave
"\u2013", # endash
"\u2014", # emdash
"\u2018", # quoteleft
"\u2019", # quoteright
"\u201a", # quotesinglbase
"\u201c", # quotedblleft
"\u201d", # quotedblright
"\u201e", # quotedblbase
"\u2020", # dagger
"\u2021", # daggerdbl
"\u2022", # bullet
"\u2026", # ellipsis
"\u2039", # guilsinglleft
```

```

"\u203a", # guilsinglright
"\u2044", # fraction
"\u2070", # uni2070
"\u2074", # uni2074
"\u2075", # uni2075
"\u2076", # uni2076
"\u2077", # uni2077
"\u2078", # uni2078
"\u2079", # uni2079
"\u2080", # uni2080
"\u2081", # uni2081
"\u2082", # uni2082
"\u2083", # uni2083
"\u2084", # uni2084
"\u2085", # uni2085
"\u2086", # uni2086
"\u2087", # uni2087
"\u2088", # uni2088
"\u2089", # uni2089
"\u20ac", # Euro
"\u2122", # trademark
"\u215b", # oneeighth
"\u215c", # threeeighths
"\u215d", # fiveeighths
"\u215e", # seveneighths
"\u2190", # arrowleft
"\u2191", # arrowup
"\u2192", # arrowright
"\u2193", # arrowdown
"\u2196", # uni2196
"\u2197", # uni2197
"\u2198", # uni2198
"\u2199", # uni2199
"\u2212", # minus
"\u2215", # uni2215
"\u2260", # notequal
"\u2264", # lessequal
"\u2265", # greaterequal
          # manual additions
'\n',

```

22 | Deeper dive into the AW-template

```
'\t',
'\u200b', # ZERO WIDTH SPACE
#'\u200c', # ZERO WIDTH NON-JOINER
'\xad', # SOFT HYPHEN
'_',

]

not_in_figtree=set()

def check_in_figtree(s, d, where, diva_id):
    for idx, c in enumerate(s):
        if c not in figtree_characters:
            not_in_figtree.add(c)
            print(f'{c=} at {idx} in {s} in {where} diva_id: {diva_id}, year: {d}')

for school in schools_info:
    print(f"{school=}")
    df1=gdf[gdf.school == school]
    if df1 is not None and not df1.empty:
        for idx, row in gdf[gdf.school == school].iterrows():
            #print(f"{idx=}")
            diva_id=row['recordInfo.recordIdentifier']
            d=row['Year']
            title=row['title.eng']
            if title and isinstance(title, str) and len(title) > 0:
                check_in_figtree(title, d, 'title.eng', diva_id)
            alt_title=row['title.swe']
            if alt_title and isinstance(alt_title, str) and len(alt_title) > 0:
                check_in_figtree(alt_title, d, 'title.swe', diva_id)
            subtitle_eng=row['subtitle.eng']
            subtitle_swe=row['subtitle.swe']
            if subtitle_eng and isinstance(subtitle_eng, str) and len(subtitle_eng) > 0:
                check_in_figtree(subtitle_eng, d, 'subtitle.eng', diva_id)
```

```
        if subtitle_swe and isinstance(subtitle_swe, str) and
           ↳ len(subtitle_swe) > 0:
            check_in_figtree(subtitle_swe, d, 'subtitle.swe'
                               ↳ , diva_id)

    print(not_in_figtree)
    not_in_figtree=set()
```

24 | Deeper dive into the AW-template

Listing 2: Part of the output about characters missing from Figtree that were used in DiVA in English and Swedish titles and subtitles - for the ABE school. Note that not all of the characters can be shown in the font used in this document. However, they can be seen in the output when you run the notebook. Here, these characters have been manually edited to use another font where the character exists.

```
school='ABE'
c='Δ' at 4 in "DELTA: exploring the fragility of
↳ perception through the medium of light." in
↳ title.eng diva_id: diva2:1683225, year: 2022
c='♀' at 3 in "RIN♀EBY - Exploring feminist design
↳ tools" in title.eng diva_id: diva2:998705, year:
↳ 2016
c='ụ' at 0 in "ụlọ - An exploration of the relevance
↳ of Igbo architecture in a low-cost housing
↳ context" in title.eng diva_id: diva2:1466320,
↳ year: 2020
c='ọ' at 2 in "ụlọ - An exploration of the relevance
↳ of Igbo architecture in a low-cost housing
↳ context" in title.eng diva_id: diva2:1466320,
↳ year: 2020
c='T' at 0 in "THE EFFECT OF INTEREST R
↳ ATEs ON HOUSING PRICES IN SWEDEN
↳ :." in title.eng diva_id: diva2:503696, year: 2011
c='ff' at 1 in "Effect of gritting sand quality on road
↳ dust pollution" in title.eng diva_id:
↳ diva2:1039310, year: 2016
c='λ' at 10 in "Using the λ coefficient method" in
↳ subtitle.eng diva_id: diva2:1880760, year: 2024
c='U+feff' at 0 in "A study of a low energy house -
↳ methods for improvning energy performance while
↳ maintaining cost efficiency" in title.swe diva_id:
↳ diva2:404035, year: 2010
c='U+fffd' at 24 in "En studie kring
↳ ombyggnar^fffdoners påverkan på den sociala
↳ hållbarheten i miljonprogramsområden" in
↳ subtitle.swe diva_id: diva2:1785925, year: 2023
```


c='U+0084' at 36 in "Experimental Studies Focusing on
 ↳ Stiffness & Transport Properties" in
 ↳ subtitle.eng diva_id: diva2:816099, year: 2015
 c='U+0087' at 57 in "Evaluation of Customer
 ↳ requirements and environmental effects" in
 ↳ subtitle.eng diva_id: diva2:781452, year: 2014

```
[U+0084, U+0087, 'Δ', 'ϕ', 'ϋ', '—', '♀', 'ff', 'fi',
↳ U+00feff, 'A', 'C', 'D', 'E', 'F', 'G', 'H',
↳ 'I', 'N', 'O', 'P', 'R', 'S', 'T', 'U', 'W',
↳ U+fffd, 'λ']
```

Table 2 summarizes the missing characters for ABE. While it is likely that U+0084, U+0087, U+FEFF, and U+FFFD are transcription errors, the remaining characters were likely intended by the authors of the theses.

Table 2: Summary of **missing** Figtree characters for ABE

Unicode character or block	characters	Unicode - range
<Index> (IND)		U+0084
<End of Selected Area> (ESA)		U+0087
Alphabetic Presentation Forms (Ligatures)	ff fi	U+FB00 - U+FB4F
Fullwidth Latin Letters	A C D E F G H I N O P R S T U W	U+FF01 - U+FF60
Greek and Coptic	Δ	U+0370 - U+03FF
Latin Extended Additional	ϕ ϋ	U+1E00 - U+1EFF
General Punctuation	—	U+2000 - U+206F
Miscellaneous Symbols	♀	U+2600 - U+26FF
Zero Width No-Break Space (BOM, ZWNBSP)		U+FEFF
Replacement Character	◆	U+FFFD
Mathematical Alphanumeric Symbols	λ	U+1D400 - U+1D7FF

Listing 3: Part of the output about characters missing from Figtree that are actually used in DiVA in English and Swedish titles and subtitles - for the ITM school.

```

school='ITM'
c='η' at 47 in "Solubility of chromium in tungsten
↳ carbide and η-phase" in subtitle.eng diva_id:
↳ diva2:460797, year: 2010
c='η' at 18 in "Evaluation of the η (Eta) nitride with
↳ three laboratory melts" in title.eng diva_id:
↳ diva2:865850, year: 2015
c='ε' at 2 in "k-ε turbulence modeling for a wind
↳ turbine" in title.eng diva_id: diva2:586991, year:
↳ 2011
c='—' at 57 in "Optimization of orders and
↳ informationmanagement systems — a case of study
↳ of a craft business" in title.swe diva_id:
↳ diva2:736430, year: 2014

'η', 'ε', '—'

```

Summarizing Listing 3, we see that there are two missing Greek characters (Greek Small Letter Eta and Greek Small Letter Epsilon) and a long line (*i.e.*, Box Drawings Light Horizontal). All of these were clearly intended by the authors of these theses.

Listing 4: Part of the output about characters missing from Figtree that are actually used in DiVA in English and Swedish titles and subtitles - for the SCI school.

```

school='SCI'
c='ff' at 25 in "An Investigation of the Effects of
  ↳ Sustained G-Forces on the Human Body During
  ↳ Suborbital Spaceflight" in title.eng diva_id:
  ↳ diva2:1183272, year: 2017
c='β' at 47 in "Co-evolutional analysis of the
  ↳ Na+,K+-ATPase's β-subunit dimerization" in
  ↳ title.eng diva_id: diva2:1768469, year: 2023
c='α' at 42 in "Method development for the study of
  ↳ human α-synuclein overexpressing rodent model of
  ↳ parkinsonism using MRI" in title.eng diva_id:
  ↳ diva2:1215368, year: 2018
c='λ' at 50 in "New scaling approach to critical
  ↳ exponents of the λ transition" in title.eng
  ↳ diva_id: diva2:1250812, year: 2018
c='ϕ' at 50 in "Optimization and Miniaturization of a
  ↳ Fiber-Optic ϕ-OTDR Distributed Vibration Sensor"
  ↳ in title.eng diva_id: diva2:1230989, year: 2018
c='fi' at 34 in "Kvantsäker gitterbaserad kryptografi"
  ↳ in title.swe diva_id: diva2:935425, year: 2016
c='*' at 82 in "Search for VBF Standard Model Higgs
  ↳ boson production in the <em>H → W W
  ↳ </em>(<em>*</em>) decay channel using boosted
  ↳ decision trees" in title.eng diva_id:
  ↳ diva2:628055, year: 2013
c='*' at 69 in "Spin studies of the discovered 125 GeV
  ↳ Higgs boson in the<em>H → W W *→ <em>fνfν</em>
  ↳ </em> channel using the ATLAS detector" in
  ↳ title.eng diva_id: diva2:628052, year: 2013
c='ν' at 77 in "Spin studies of the discovered 125 GeV
  ↳ Higgs boson in the<em>H → W W *→ <em>fνfν</em>
  ↳ </em> channel using the ATLAS detector" in
  ↳ title.eng diva_id: diva2:628052, year: 2013

```

28 | Deeper dive into the AW-template

```
c='γ' at 0 in "γ-ray spectroscopy for earthquake
↳ forecasting" in title.eng diva_id: diva2:1881360,
↳ year: 2024

'∗', 'β', 'fl', 'λ', 'α', 'ff', 'fi', 'v', 'γ', 'φ'
```

Summarizing Listing 4, we see a number of Greek characters and ligatures, but we also see in diva2:628055 and diva2:628052 other problems – specifically, a missing space and the Higgs decay channel expression being incorrectly entered in DiVA. In HTML, the first should be `H → W W^{∗}` and the second should be `H → W W^{∗} → ℓνℓν`.

Listing 5: Part of the output about characters missing from Figtree that are actually used in DiVA in English and Swedish titles and subtitles - for the CBH school.

```

school='CBH'
c='α' at 57 in "Amino Alcohols from Asymmetric
  ↳ Transfer Hydrogenation of α-Amido-β-Keto Esters
  ↳ Possessing Olefins: Formal Total Synthesis of
  ↳ Sphingosine" in title.eng diva_id: diva2:766179,
  ↳ year: 2012
c='β' at 65 in "Amino Alcohols from Asymmetric
  ↳ Transfer Hydrogenation of α-Amido-β-Keto Esters
  ↳ Possessing Olefins: Formal Total Synthesis of
  ↳ Sphingosine" in title.eng diva_id: diva2:766179,
  ↳ year: 2012
c='γ' at 47 in "Catalytic Ozonation with
  ↳ MnOx-CeO<sub>x</sub>/
  ↳ γ-Al<sub>2</sub>O<sub>3</sub> for Wastewater
  ↳ Treatment of Textile Effluent" in title.eng
  ↳ diva_id: diva2:1382127, year: 2019
c='ω' at 48 in "Changing or improving the
  ↳ enantioselectivity of ω-transaminase towards
  ↳ (R)-amines, utilizing a semi-rational design
  ↳ approach" in title.eng diva_id: diva2:744712,
  ↳ year: 2013
c='Υ' at 86 in "Characterization of diazepam binding
  ↳ inhibitor as a structure-function tool for human
  ↳ Υ-aminobutyric acid-A receptors" in title.eng
  ↳ diva_id: diva2:1788591, year: 2023
c='fl' at 22 in "Djupinlärningsbaserad fler-etikett
  ↳ klassificering av målvolymmer för prostatacancer
  ↳ inom strålterapi" in title.swe diva_id:
  ↳ diva2:1392274, year: 2019
c='β' at 76 in "Development and Validation of an
  ↳ Analytical Method for the Determination of
  ↳ β-antithrombin" in title.eng diva_id:
  ↳ diva2:1774619, year: 2023

```

30 | Deeper dive into the AW-template

```
c='ff' at 86 in "Implementing a Next Generation
↳ Sequencing (NGS) method to characterize padlock
↳ probe efficiency" in title.eng diva_id:
↳ diva2:1876306, year: 2024
c='U+2029' at 19 in "vattenkvalitet och
↳ tillgänglighet" in subtitle.swe diva_id:
↳ diva2:826701, year: 2013
c='δ' at 18 in "POLYMERIZATION OF δ-VALERO LACTONE BY
↳ NOVEL CYCLODEXTRIN DIMER" in title.eng diva_id:
↳ diva2:765808, year: 2012

'Ÿ', 'β', 'fl', 'α', 'fi', 'ff', 'β', U+2029, 'δ', 'ω',
↳ 'γ'
```

Summarizing Listing 5, we see the expected ligatures and Greek characters and also Mathematical Italic Small Beta (β), and Latin Small Letter Gamma (γ). Finally, there is a Paragraph Separator (U+2029) that is probably a result of a cut and paste from the PDF file of the thesis diva2:826701.

Listing 6: Part of the output about characters missing from Figtree that are actually used in DiVA in English and Swedish titles and subtitles - for the EECS school.

```

school='EECS'
c='°' at 25 in "A 2-layer Solution for 45° Slant
  ↳ Polarized Slotted Waveguide Arrays in Gap
  ↳ Waveguide Technology" in title.eng diva_id:
  ↳ diva2:1888346, year: 2023
c='U+200c' at 62 in "Adaptation of an online course
  ↳ from desktop to mobile browsers" in title.eng
  ↳ diva_id: diva2:1088548, year: 2016
c='U+3000' at 0 in "    Jämförelse av teknik för
  ↳ tredimensionell TV med avseende på bildupplevelse"
  ↳ in title.eng diva_id: diva2:467409, year: 2011
c='fi' at 17 in "Innehållsbaserad filtrering för
  ↳ applikationsprogramvara" in title.swe diva_id:
  ↳ diva2:1186070, year: 2018
c='U+2028' at 39 in "Evaluating Situation Awareness
  ↳ Oriented Design Principles as a Design Tool" in
  ↳ title.eng diva_id: diva2:823781, year: 2015
c='α' at 3 in "Ly-α Dayglow on Uranus" in title.eng
  ↳ diva_id: diva2:1545323, year: 2021
c='U+0092' at 74 in "Shared UMTS Networks - A
  ↳ Techno-Economic Study on Mobile Network Operators
  ↳ Possibilities to Deliver Unique Products and
  ↳ Services" in title.eng diva_id: diva2:383909,
  ↳ year: 2005
c='U+feff' at 71 in "Simulation and parameter
  ↳ estimation of spectrophotometric instruments  " in
  ↳ title.eng diva_id: diva2:308052, year: 2009
c='ff' at 33 in "The backtracking algorithm and
  ↳ different representations for solving Sudoku
  ↳ Puzzles" in title.eng diva_id: diva2:721641, year:
  ↳ 2014
c=';' at 74 in "Validering av enterpriseLang Ett
  ↳ domänspecifikt språk baserat på ramverket; Meta
  ↳ Attack Language" in subtitle.swe diva_id:
  ↳ diva2:1596039, year: 2021

```

32 | Deeper dive into the AW-template

```
c='μ' at 0 in "μSPL - Proprietär  
↳ grafikspråkstranspilator" in title.swe diva_id:  
↳ diva2:1634246, year: 2021  
  
[U+0092, ';', 'α', 'μ', U+200c, U+2028, '◦', U+3000,  
↳ 'ff', 'fi', U+feff]
```

Note that in Listing 6, we see the expected ligatures and Greek characters, but we also see a surprise as the Greek Question Mark (‘;’ U+037E - which looks like a semicolon) is not in Figtree. Also unexpected are a <Private Use Two> (PU2) (U+0092) character, a Zero Width Non-Joiner (ZWNJ) (U+200C), a Line Separator (U+2028), an Ideographic Space (U+3000), and a Zero Width No-Break Space (BOM, ZWNBSP) (U+FEFF). Most of these unexpected characters are probably the result of cut and paste transcription errors and not intended by the authors of the theses.

In addition to ligatures, wide characters, and some curious characters that should probably not actually be stored in titles and subtitles in DiVA, what is commonly missing are Greek characters. One might think that in an engineering school, one would be guided by looking at the data*. Oops – Figtree has no support and plans no support for Greek!

NB It is important to note that the problems associated with characters that are missing in the Figtree font are now exacerbated since Figtree is specified in the AW-template as the font for *all of the headings in the thesis* and not just for titles and subtitles on the cover and title page.

Looking at Noto Sans, we can see in Table 3 that the Alphabetic Presentation Forms (Ligatures), the Greek and Coptic characters, and Latin Extended Additional are present in NotoSans. However, there are still missing characters for Arrows, Mathematical Operators, Miscellaneous Symbols, and Mathematical Alphanumeric Symbols. Note that the two characters shown in Mathematical Alphanumeric Symbols look like Greek characters, but they are actually the Mathematical Italic Small Lamda and the Mathematical Italic Small Beta. Note that the FullWidth Latin characters are in the *Noto Sans Mono CJK JP* font. The General Punctuation, Arrows, Mathematical Operators, Box Drawing, and Miscellaneous Symbols are in the *STIX Two Math* font.

*As an example of making use of data to guide research and development, see Alfred Spector, Peter Norvig, and Slav Petrov, ‘Google’s hybrid approach to research’[2].

Table 3: Summary of **missing** Noto Sans characters for all schools

Unicode character or block	characters	Unicode - range
<Index> (IND)		U+0084
<End of Selected Area> (ESA)		U+0087
Alphabetic Presentation Forms (Ligatures)		U+FB00 - U+FB4F
Fullwidth Latin Letters	A C D E F G H I N O P R S T U W	U+FF01 - U+FF60
Greek and Coptic		U+0370 - U+03FF
Latin Extended Additional		U+1E00 - U+1EFF
General Punctuation	— —	U+2000 - U+206F
Arrows	→	U+2190 - U+21FF
Mathematical Operators	— * ≈	U+2200 - U+22FF
Box Drawing	—	U+2500 - U+257F
Miscellaneous Symbols	♀	U+2600 - U+26FF
Zero Width No-Break Space (BOM, ZWNBSP)		U+FEFF
Replacement Character		U+FFFD
Mathematical Alphanumeric Symbols	λ β	U+1D400 - U+1D7FF

2.3.5 Use of fonts within the thesis

The thesis template “Avhandlingsmall Word” from <https://www.kth.se/student/studier/examensarbete/avhandlingarochoexamensarbeten/mall-for-avhandling-1.458236> specifies the use of fonts for the preface pages and the body of the thesis. Figree has been used as a sans serif font for headings. They have specified the use of Georgia as the serif font for the body. Unfortunately, Georgia is a proprietary font; hence, there may be license issues with using it via \LaTeX .

To avoid problems with proprietary fonts, this template has used the font setup shown in Listing 7 - as the default main font, sans serif font, and monospaced font in the thesis. More specifically, this template has used TeX Gyre Termes, a Times-like font, as the main font; TeX Gyre Heros, a Helvetica-like font, as the sans serif font; TeX Gyre Cursor, a Courier-like font, as the monospaced font; and STIX Two Math as the math font*. Additionally, it makes available the STIX[†] Two Math font as `\mystixmathfont`. This font contains a very large number (more than 5 200) glyphs that are useful - see the CTAN[‡] documentation for the package “`stix2-otf` – OpenType Unicode text and maths fonts”. Moreover, the STIX fonts are available under the SIL Open Font License. For additional information, see OpenType-based math typesetting: An introduction to the STIX2 OpenType fonts.

Note also that `\babelfont` has been used to provide fonts suitable for a number of languages that might be used in a thesis, especially in abstracts and keywords.

Listing 7: The main fonts used in the template in addition to Figtree

```
\RequirePackage{fontspec}
\defaultfontfeatures{Ligatures={TeX}} % This enables TeX
↪ style ligatures such as ---, ', ``, and so on

\ifinswedish
  \usepackage[english, main=swedish, bidi=basic]{babel}
\else
  \usepackage[swedish, main=english, provide+=*, bidi=basic
  ↪ ]{babel}
\fi

\babelfont{rm}{TeX Gyre Termes}
\DeclareFontShape{TU}{TeXGyreTermes(0)}{md}{n}{<->sub *
  ↪ TeXGyreTermes(0)/m/n}{}
\DeclareFontShape{TU}{TeXGyreTermes(0)}{sb}{n}{<->ssub *
  ↪ TeXGyreTermes(0)/b/n}{}
\DeclareFontShape{TU}{TeXGyreTermes(0)}{sb}{it}{<->ssub *
  ↪ TeXGyreTermes(0)/b/it}{}

```

* Alternatively, one might use TeX Gyre Pagella Math as the math font.

[†] STIX Project (Scientific and Technical Information Exchange)

[‡] Comprehensive T_EX Archive Network

```

%\setsansfont{TeX Gyre Heros} %% Helvetica like font
\babelfont{sf}{TeX Gyre Heros}
%\setmonofont[Ligatures={NoCommon}, Numbers={Lining,
  ↪ Monospaced}]{TeX Gyre Cursor} %% Courier like font
\babelfont{tt}{TeX Gyre Cursor}
\begin{comment}
  \babelfont[english]{rm}{TeX Gyre Termes}
  \babelfont[english]{sf}{TeX Gyre Heros}
  \babelfont[english]{tt}{TeX Gyre Cursor}
\end{comment}

% \setmathfont{TeX Gyre Termes Math} %% a math font
\usepackage{mathtools}
\usepackage[warnings-off={mathtools-colon,mathtools-
  ↪ overbracket}]{unicode-math}
% The [version=bold, FakeBold=1.2] is to avoid a warning
  ↪ about the lack of a bold font
%\setmathfont{TeX Gyre Pagella Math}[version=bold,
  ↪ FakeBold=1.2] %% a font for math
\setmathfont{STIX Two Math}[version=normal]
%\setmathfont{TeX Gyre Pagella Math}[version=normal]
\setmathfont{TeX Gyre Pagella Math}[version=bold,
  ↪ BoldFeatures={FakeBold=1.5}]
% For both XeLaTeX and LuaLatex for getting access to
  ↪ unicode symbols
%\newfontfamily\myfont[CharacterVariant=1]{NewCM10-
  ↪ Regular.otf}
% STIX Project (Scientific and Technical Information
  ↪ Exchange)
% STIX Two Math does not have bold face - so we fake it
%\newfontfamily\mystixmathfont[BoldFeatures={FakeBold
  ↪ =1.5}, BoldItalicFeatures={FakeBold=1.5}]{STIX Two
  ↪ Math}
\newfontfamily\mystixmathfont{STIX Two Math}
% STIX Two Math does not have a bold font, but it has
  ↪ bold symbols with an without serifs - but you
  ↪ manually have to use them, unless you are in math
  ↪ mode - then you can use \symbf{}
% and this will return the bold serif version of the
  ↪ character

```

36 | Deeper dive into the AW-template

```
\DeclareFontShape{TU}{STIXTwoMath(0)}{b}{n}{<->ssub *  
  ↪ STIXTwoMath(0)/m/n}{}  
\DeclareFontShape{TU}{STIXTwoMath(0)}{sb}{n}{<->ssub *  
  ↪ STIXTwoMath(0)/m/n}{}  
\newfontfamily\mystixtextfont{STIX Two Text}  
  
% use english as a fallback when in other languages  
\babelprovide[import, onchar=ids fonts]{english}  
  
% for new KTH cover  
% Load the Figtree font as it is used for the new KTH  
  ↪ graphical profile  
%  
  
\newfontfamily{\FigtreeFont}[Ligatures=TeX,  
  Path=./Figtree/static/,  
  Extension = .ttf,  
  UprightFont=*-Regular,  
  BoldFont=*-Bold,  
  BoldItalicFont=*-BoldItalic,  
  ItalicFont=*-Italic,  
  FontFace={l}{n}{*-Light},  
  FontFace={l}{it}{*-LightItalic},  
  FontFace={md}{n}{*-Medium},  
  FontFace={md}{it}{*-MediumItalic},  
  FontFace={sb}{n}{*-Semibold},  
  FontFace={sb}{it}{*-SemiBoldItalic},  
  FontFace={k}{n}{*-Black},  
  FontFace={k}{it}{*-BlackItalic},  
  FontFace={eb}{n}{Font=*-ExtraBold},  
  FontFace={eb}{it}{Font=*-ExtraBoldItalic}  
]{Figtree}  
  
\newfontfamily\pageNumberFont{Figtree} %% set the font to  
  ↪ use for page numbering  
  
\newfontfamily{\NotoEmojiFont}[Ligatures=TeX,  
  Path=./Noto_Emoji/static/,
```

```

Extension = .ttf,
UprightFont=*-Regular,
BoldFont=*-Bold,
FontFace={l}{n}{*-Light.ttf},
FontFace={md}{n}{*-Medium},
FontFace={sb}{n}{*-SemiBold},
]{NotoEmoji}

% To set the abstract headings in Figtree we redefine the
↪ abstravt environment to look at the language being
↪ used and use the appropriate font, with the default
↪ being Figtree
% The languages that are automatically introduced by
↪ Babel have a name of the form xxxfont and xxxfontsf
↪ ; where xxxfont is the serif font and xxxfontsf is
↪ the ssans erif font.
% This means that for each language that Figtree does not
↪ support, you have to define the sans serif and
↪ serif font to use.

\babelprovide[import, onchar=ids fonts]{greek}
\babelfont[greek]{rm}{Noto Serif}
\babelfont[greek]{sf}{Noto Sans}
\babelfont[greek]{tt}{Noto Mono}

\babelprovide[import, onchar=ids fonts]{hindi}
\babelfont[hindi]{rm}{Noto Serif Devanagari}
\babelfont[hindi]{sf}{Noto Sans Devanagari}
\babelfont[hindi]{tt}{Noto Sans Devanagari} % Noto Mono
↪ does not have the glyphs

\babelprovide[import, onchar=ids fonts]{russian}
\babelfont[russian]{rm}{Noto Serif}
\babelfont[russian]{sf}{Noto Sans}
\babelfont[russian]{tt}{Noto Mono}

\babelprovide[import, onchar=ids fonts]{chinese-
↪ simplified}
\babelfont[chinese-simplified]{rm}{Noto Serif CJK SC}

```

```

\babelfont[chinese-simplified]{sf}{Noto Sans CJK SC}
\babelfont[chinese-simplified]{tt}{Noto Sans Mono CJK SC}

\babelfont[chinese-traditional]{rm}{Noto Serif CJK TC}
\babelfont[chinese-traditional]{sf}{Noto Sans CJK TC}
\babelfont[chinese-traditional]{tt}{Noto Sans Mono CJK
    ↪ TC}

\babelprovide[import, onchar=ids fonts]{japanese}
\babelfont[japanese]{rm}{Noto Serif CJK JP}
\babelfont[japanese]{sf}{Noto Sans CJK JP}
\babelfont[japanese]{tt}{Noto Sans Mono CJK JP}

% If you are going to use Arabic

\babelprovide[import, onchar=ids fonts]{arabic}
\babelfont[arabic]{rm}{Noto Naskh Arabic}
\babelfont[arabic]{sf}{Noto Sans Arabic}
\babelfont[arabic]{tt}{Noto Sans Arabic}
% If one really needs a monospaced font, one might try
    ↪ Kawkab Mono
% However, it seems that it is a work in progress - see
    ↪ https://makkuk.com/kawkab-mono/ and https://github.com/aiaf/kawkab-mono/tree/master

\babelprovide[import, onchar=ids fonts]{centralkurdish}
\babelfont[centralkurdish]{rm}{Noto Naskh Arabic}
\babelfont[centralkurdish]{sf}{Noto Sans Arabic}
\babelfont[centralkurdish]{tt}{Noto Sans Arabic}

% If you are going to use Hebrew

\babelprovide[import, onchar=ids fonts]{hebrew}
\babelfont[hebrew]{rm}{Noto Serif Hebrew}
\babelfont[hebrew]{sf}{Noto Sans Hebrew}
\babelfont[hebrew]{tt}{Noto Sans Hebrew}

\babelprovide[import, onchar=ids fonts]{vietnamese}
\babelfont[vietnamese]{rm}{Noto Serif}
\babelfont[vietnamese]{sf}{Noto Sans}

```

```

\babelfont[vietnamese]{tt}{Noto Mono}

% The Overleaf TeX Live includes these fonts, so there
  ↪ is little you have to do!
% The list of such fonts is at https://www.overleaf.com/
  ↪ learn/latex/Questions%2FWhich_OTF_or_TTF_fonts_are
  ↪ _supported_via_fontspec%3F
%
\newfontfamily{\NotoSansJPFont}[Ligatures=TeX,
  ]{Noto Sans Mono CJK JP}

\newfontfamily{\NotoSansFont}[Ligatures=TeX,
  ]{Noto Sans}

\newfontfamily{\NotoSerifFont}[Ligatures=TeX,
  ]{Noto Serif}

\newfontfamily{\DejaVuSansFont}[Ligatures=TeX,
  ]{DejaVu Sans}

```

2.3.6 Mapping unicode characters to fonts

It is possible to map a given unicode character to a character in a given font. For example, it is possible to always transform the unicode character β to the character β in a Greek font (in this case `\greekfont`), as shown in Listing 8.

Listing 8: Mapping the unicode β character to a particular character in the `\greekfont`

```

\newunicodecharβ{}{\iffontchar\fontβ` β\else{{\greekfont β}}\fi
  ↪ } % Greek Small Letter Beta

```

This mapping is very useful, as it enables an author who uses a tool that allows entry and display of unicode content to directly type what they want. As long as there is a mapping in the font that is currently being used, there is no extra work needed. However, when you want to use this character outside of an environment that provides the desired character, you will get an error in the log file about a missing character. For each of these missing characters, you can define a mapping and then use this character anywhere. This is further illustrated in Section 7.1.

To help the author, these mappings are placed in files in a folder called `unicode_blocks` in files with names of the form: `U+<start_hex>-U+<end_hex>-<Block Name>.tex`.

U+<start_hex>-U+<end_hex> Provides the precise Unicode range, which is standardized and unambiguous.

<Block Name> Adds a human-readable description (e.g., “Greek and Coptic”, “Devanagari”), making it intuitive.

.tex Standard extension for LaTeX source files.

The content of these files in this template is based on those I found relevant or interesting when working on this template and its examples*. The file `lib/defines.tex` inputs the different files, so you are free to comment out the input if it is not relevant to your thesis or to add additional files as needed for your thesis.

The files `README_notes/characters_used_reduced` and `README_notes/characters_used` use the `longtable` package to realize multi-page long tables. Note that in some cases, the characters are replaced by macros that generate a version of the character while avoiding problems with the parsing of the table entries. Also note that in some cases, the characters have to be used in a **math** environment; hence, they are within a pair of dollar signs. Table 4 shows a condensed table with all of the non-excluded characters that were used. Note that this table is slightly more than 5 pages long.

*I have tried to include most of the characters used in titles, subtitles, abstracts, and keywords of theses in DiVA on or before 2025-05-28. As of that date, 2001 different characters had been used from a variety of fonts. After excluding characters that are in the Private Use Area (U+E000 - U+F8FF), and the Supplementary Private Use Area-B (U+100000 - U+10FFFF); along with non-printing control characters in Latin-1 Supplement (U+0080 - U+00FF). There are 1941 characters used.

Note that some lines in these files are commented out. The characters have the following values and meanings: 0xfdd3 is unassigned (*i.e.*, it does not have a printed representation) from the Arabic Presentation Forms-A block, 0xfe0f is VARIATION SELECTOR-16 from the Variation Selectors block, 0xfeff is a ZERO WIDTH NO-BREAK SPACE from the Arabic Presentation Forms-B block, and 0xff5e is FULLWIDTH TILDE from the Halfwidth and Fullwidth Forms block. The last of these seems to trigger the parsing that would occur for a tilde character, even though this character has a different unicode point. VARIATION SELECTOR-16 (VS16) is used in conjunction with emojis (as the previous character) to specify emoji-style (with color), while VS15 is used to specify text-style (*i.e.*, monochrome) emojis.

If you are working with the unicode values, two useful references are: Unicode Charts for STIX Two Math Regular and Compart AG's Unicode webpages. If you are on a Linux machine, you can use the command: `fc-list:charset=xxxx`, where `xxxx` is the hexadecimal value of a unicode point - this will list which fonts on your system include this codepoint. After determining which font or fonts include this codepoint, you then look for an applicable font name in `kththesis.cls` to use when making your entry into the relevant **unicode_blocks** file. Listing 9 on 49 shows a Python code snippet that might be helpful.

Another useful source is The Comprehensive L^AT_EX Symbol List with its 20 323 symbols and commands.

Table 4: Characters used in titles, subtitles, keywords, and abstracts for theses in DiVA (on or before 2025-05-28) or in this document

[illegible]

Continued on next page

Table 4 – continued from previous page

[illegible]

Table 4 – continued from previous page

char	hex	Name	Block	start	end
⟨,⟩			Miscellaneous Mathematical Symbols-A	0x27c0	0x27ef
×, ≅			Supplemental Mathematical Operators	0x2a00	0x2aff
√			Latin Extended-C	0x2c60	0x2c7f
.			Supplemental Punctuation	0x2e00	0x2e7f
,、,。 ,々,「,」			CJK Symbols and Punctuation	0x3000	0x303f
あ, い, う, え, お, か, が, く, け, げ, こ, さ, し, す, そ, た, だ, っ, つ, づ, て, で, と, ど, な, に, の, は, び, ぶ, へ, ほ, ぼ, ま, め, も, や, よ, ら, り, る, れ, わ, を, ん			Hiragana	0x3040	0x309f
ィ, イ, ガ, ク, グ, サ, シ, ス, ゼ, ソ, ダ, ッ, テ, デ, ト, ド, ネ, ノ, ハ, バ, ブ, プ, ベ, ホ, ポ, マ, ヨ, ラ, リ, ル, ロ, ワ, シ, ・, ー			Katakana	0x30a0	0x30ff
一, 万, 三, 上, 下, 不, 与, 丑, 专, 且, 世, 业, 东, 丢, 两, 严, 丧, 个, 中, 丰, 临, 为, 主, 义, 之, 乍, 乏, 乘, 乙, 也, 乳, 了, 予, 争, 事, 二, 于, 互, 五, 井, 亚, 些, 交, 亥, 亦, 产, 享, 亮, 亲, 人, 仅, 今, 介, 仍, 从, 仓, 他, 代, 以, 仪, 们, 件, 价, 仿, 企, 优, 伙, 会, 传, 伤, 估, 伴, 伸, 似, 但, 位, 低, 体, 何, 余, 作, 使, 例, 供, 依, 侧, 侵, 便, 係, 促, 保, 信, 修, 候, 值, 假, 偏, 做, 停, 偿, 储, 催, 像, 僚, 億, 儼, 允, 元, 充, 先, 光, 克, 免, 入, 全, 公, 共, 关, 其, 具, 养, 内, 再, 冰, 冲, 决, 况, 冶, 冷, 冻, 淮, 减, 凝, 几, 凹, 出, 击, 分, 切, 列, 则, 初, 利, 别, 到			CJK Unified Ideographs	0x4e00	0x9fff

Continued on next page

Table 4 – continued from previous page

char	hex	Name	Block	start	end
制, 刷, 刻, 剂, 削, 前, 剥, 剧, 力, 功, 加, 动, 助, 効, 势, 勃, 動, 募, 包, 化, 北, 匱, 区, 医, 十, 千, 升, 半, 华, 协, 单, 南, 占, 危, 即, 却, 卵, 卷, 厂, 压, 厌, 原, 去, 参, 及, 友, 反, 发, 取, 受, 变, 叠, 口, 句, 另, 只, 召, 可, 台, 号, 司, 各, 合, 同, 名, 后, 向, 吨, 含, 听, 启, 吸, 呈, 味, 命, 和, 品, 响, 哑, 唆, 唇, 唯, 唾, 商, 問, 善, 器, 噬, 四, 回, 因, 团, 困, 围, 固, 国, 图, 圆, 土, 在, 地, 圾, 均, 块, 坝, 垃, 型, 埋, 域, 培, 基, 堆, 場, 塑, 境, 增, 墨, 墩, 壁, 壤, 土, 壬, 壳, 处, 备, 变, 复, 外, 多, 够, 大, 天, 失, 夹, 奥, 好, 如, 妻, 始, 媒, 子, 孔, 存, 季, 学			CJK Unified Ideographs	0x4e00	0x9fff
宁, 它, 守, 安, 完, 宏, 宗, 官, 定, 宝, 实, 室, 宫, 害, 家, 容, 宽, 寄, 密, 富, 寒, 察, 寸, 对, 寻, 导, 对, 射, 将, 導, 小, 少, 尝, 尤, 就, 尺, 尽, 局, 层, 屏, 展, 属, 山, 岌, 岩, 峰, 崔, 嵌, 川, 巡, 巢, 工, 巨, 差, 已, 市, 布, 带, 帮, 常, 冪, 干, 平, 年, 并, 广, 床, 庠, 应, 底, 废, 度, 廉, 延, 建, 开, 异, 式, 引, 弱, 強, 强, 归, 当, 彗, 形, 影, 彻, 往, 征, 径, 很, 律, 得, 御, 微, 心, 必, 応, 快, 念, 忽, 态, 思, 性, 总, 恒, 恢, 息, 情, 惰, 愈, 意, 感, 慮, 成, 我, 或, 战, 戰, 截, 戸, 所, 扁, 手, 才, 扩, 扮, 扰, 找, 技, 把, 抑, 投, 抗, 扞, 护, 报, 拉, 拖, 拟, 择, 括, 持, 指			CJK Unified Ideographs	0x4e00	0x9fff

Continued on next page

Table 4 – continued from previous page

char	hex	Name	Block	start	end
挑, 举, 挥, 振, 捉, 捕, 损, 换, 据, 掌, 排, 掘, 探, 接, 控, 推, 掺, 描, 提, 握, 揭, 搭, 摄, 摘, 摸, 支, 收, 改, 放, 政, 故, 效, 敏, 教, 散, 数, 整, 文, 料, 斯, 新, 方, 施, 旋, 族, 无, 日, 旧, 旨, 早, 时, 昀, 明, 易, 是, 显, 普, 景, 晶, 暑, 暗, 暴, 曝, 曲, 曳, 更, 替, 最, 月, 有, 服, 期, 木, 未, 本, 术, 机, 杀, 杂, 杈, 材, 条, 来, 板, 极, 构, 析, 果, 枝, 架, 某, 染, 柔, 查, 柳, 查, 栅, 标, 栈, 样, 核, 根, 格, 框, 案, 械, 检, 碗, 楚, 概, 構, 樣, 槽, 標, 模, 橫, 機, 次, 欧, 款, 止, 正, 此, 步, 殊, 残, 段, 每, 毒, 比, 毫, 氏, 民, 气, 氛, 氛, 氢, 氧, 氨, 氮, 水, 求, 污, 江, 池			CJK Unified Ideographs	0x4e00	0x9fff
污, 決, 汽, 没, 河, 油, 治, 治, 泄, 法, 泛, 泡, 波, 泥, 注, 洞, 洪, 洲, 活, 派, 流, 浅, 浆, 测, 济, 浓, 海, 浸, 涂, 消, 涉, 润, 液, 淬, 深, 混, 添, 清, 渍, 渐, 渗, 減, 渠, 渡, 温, 游, 湮, 湾, 湿, 源, 溢, 溶, 滑, 滯, 滤, 滩, 漂, 漏, 演, 潜, 潮, 激, 灌, 火, 灭, 灰, 灵, 炎, 炭, 点, 炅, 烈, 烧, 热, 炔, 烷, 烓, 焦, 然, 熔, 燃, 燥, 片, 牛, 物, 特, 犬, 状, 独, 猪, 猷, 率, 环, 现, 玻, 珠, 現, 球, 理, 璃, 環, 瓶, 甘, 甚, 生, 用, 由, 甲, 电, 男, 界, 留, 略, 畦, 異, 疗, 疫, 疾, 病, 症, 瘤, 癌, 癸, 白, 百, 的, 皮, 益, 盍, 盐, 监, 盖, 目, 直, 相, 真, 眼, 着, 督, 瞬, 矢, 矣, 知, 矩, 短, 石, 矿			CJK Unified Ideographs	0x4e00	0x9fff



Continued on next page

Table 4 – continued from previous page

char	hex	Name	Block	start	end
研, 础, 硅, 硫, 硬, 确, 碍, 碳, 磁, 磷, 示, 社, 稟, 离, 禾, 秀, 私, 种, 科, 秒, 积, 称, 移, 程, 税, 稳, 究, 空, 穿, 突, 窒, 立, 站, 竞, 競, 符, 第, 等, 筑, 策, 筛, 简, 算, 管, 篇, 米, 类, 粒, 粗, 粘, 精, 糖, 糙, 系, 紊, 素, 索, 紧, 累, 組, 結, 続, 緩, 纤, 约, 级, 纯, 纳, 纵, 纸, 纹, 线, 组, 细, 织, 终, 经, 结, 给, 络, 绝, 统, 续, 维, 综, 绿, 缓, 缘, 缩, 缺, 罐, 网, 置, 群, 羧, 義, 翻, 考, 者, 而, 耒, 耗, 耦, 耳, 联, 聚, 肠, 股, 育, 肽, 肿, 胀, 胃, 背, 胞, 胶, 能, 脱, 睛, 膜, 膨, 自, 至, 致, 輿, 般, 良, 色, 艺, 节, 芋, 芳, 苜, 苯, 范, 茱, 茎, 药, 荷, 获, 萄, 著, 葡, 蒙, 蒸, 蓬, 蔽, 薄, 薏, 藻			CJK Unified Ideographs	0x4e00	0x9fff
虑, 虽, 蚀, 蛋, 融, 行, 衍, 術, 衡, 补, 表, 衰, 被, 裂, 装, 裸, 複, 要, 覆, 見, 規, 視, 觀, 见, 观, 规, 视, 角, 解, 触, 言, 話, 調, 論, 護, 计, 认, 讨, 让, 议, 许, 论, 设, 访, 证, 评, 识, 词, 译, 试, 诚, 该, 详, 误, 诱, 说, 诸, 读, 调, 谐, 谱, 象, 費, 贝, 负, 贡, 质, 贵, 资, 赖, 走, 起, 超, 越, 趋, 趾, 跃, 距, 跟, 路, 踪, 身, 車, 軚, 較, 车, 轧, 轨, 转, 软, 载, 较, 辅, 辐, 输, 辨, 边, 达, 迁, 迅, 过, 运, 近, 还, 这, 进, 远, 连, 述, 迹, 追, 退, 适, 选, 透, 逐, 通, 速, 造, 進, 遍, 過, 道, 選, 避, 邻, 部, 都, 配, 酚, 酯, 酰, 酸, 采, 释, 里, 重, 量, 金, 针, 钙, 钛, 钟, 钠, 钢, 钾, 铁, 银, 链			CJK Unified Ideographs	0x4e00	0x9fff
锂, 错, 键, 长, 門, 開, 閔, 门, 闭, 问, 间, 閥, 闕, 闡, 防, 阴, 阻, 附, 际, 降, 限, 陡, 除, 险, 陷, 階, 随, 際, 障, 隶, 难, 集, 雜, 需, 露, 静, 非, 靠, 面, 革, 靶, 頃, 題, 页, 顶, 项, 须, 预, 领, 频, 颀, 题, 风, 飞, 饰, 首, 香, 马, 驱, 验, 驟, 骨, 高, 魏, 鹤, 黏, 鼠			CJK Unified Ideographs	0x4e00	0x9fff

Continued on next page

Table 4 – continued from previous page

char	hex	Name	Block	start	end
β, Ƴ			Latin Extended-D	0xa720	0xa7ff
ff, fi, fl, ffi, ffl,			Alphabetic Presentation Forms	0xfb00	0xfb4f
%, (,) , , , −, . , 4, :, ; , A, C, D, E, F, G, H, I, N, O, P, R, S, T, U, W			Halfwidth and Fullwidth Forms	0xff00	0xffef
 , 			Specials	0xfff0	0xffff
A, B, C, D, E, F, G, H, I, K, L, M, N, O, P, Q, R, S, T, V, W, Z, a, c, d, e, g, i, k, l, m, n, o, p, q, r, s, t, u, x, y, z, α, β, γ, ζ, η, λ, μ, π, σ, φ, ω, θ			Mathematical Alphanumeric Symbols	0x1d400	0x1d7ff

Listing 9: Python snippet to generate a range of `\newunicodechar` entries, in this case for U+0900-U+097F-Devanagari

```
import unicodedata

def main():
    #fontname='mystixmathfont'
    fontname='hindifont'

    # U+0900-U+097F-Devanagari.tex
    start_value=0x0900
    end_value=0x097F
    for i in range(start_value, end_value+1):
        hex_value=f"{i:x}"
        cx_length=len(hex_value)
        xprefix=''
        for j in range(1, cx_length+1):
            xprefix=xprefix+'^'
        hex_value=f"{xprefix}{hex_value}"
        #print(f"{i}\t{hex_value}")
        try:
            x1=unicodedata.name(chr(i))
        except ValueError:
            print(f"%{i:x} is unassigned")
            continue
        print("\newunicodechar{"+f"{hex_value}"+"}{\\
↪ iffontchar\\font`"+f"{hex_value}"+"{f"{hex_value}
↪ "+ "\\else{{\\{fontname}_{f"{hex_value}"+"}}\\fi
↪ }_{f"{unicodedata.name(chr(i))}"})")
```

In most theses, there is no need for having the character outside of a suitable language context, either entered by a `\selectlanguage{x}` or `\foreignlanguage{x}{xxxxx}` - thus most of the mechanisms described above are unnecessary. This is one of the great advantages of using babel.

2.4 Headings

The optional Dedication page does not have a heading. All of the other preface pages (except for the “Table of Contents”) have an unnumbered heading. The AW-template calls this paragraph style “RomanList”. However, I believe that this paragraph style **should** be called “Unnumbered heading 1”. This style sets the text in Figtree Medium 24pt. Chapters should use this same style, but with numbering. This chapter numbering style is called “Heading 1” in the AW-template.

The table of contents heading uses a style called “TOCHHeading” in the AW-template. This uses Figtree Medium 22pt and all caps. It is not clear to me why there is this difference in style. My assumption is that since the table of contents is automatically generated, this heading is also automatically generated and that this uses a style called “TOC Heading”. I think that to be more consistent with the other preface pages, this should also be set in Figtree Medium 24pt and **not** set in all caps.

The previous two paragraphs illustrate a difference in how paragraph styles are referred to by names and IDs. This is illustrated in the XML as:

Listing 10: Two lines of the TOCHHeading paragraph style

```
<w:style w:type="paragraph" w:styleId="TOCHHeading">
    <w:name w:val="TOC_Heading"/>
```

Listing 11: Two lines of the Heading 1 paragraph style

```
<w:style w:type="paragraph" w:styleId="Heading1">
    <w:name w:val="heading_1"/>
```

At present, I do not understand why the capitalization and spacing are as they appear to be, with the paragraph style appearing in the list of paragraph styles as “Heading 1” - but it has the name and ID as shown above. I will try to write the names as they appear in the list of styles unless another ID or name is more suitable.

Note that the AW-template does not define something equivalent to a \LaTeX part. My \LaTeX template defines formatting for those headings shown in Table 5.

At present, my template does not try to reproduce the line spacing.

Table 5: Heading paragraph styles

\LaTeX	OOXML	Figtree Font	Size pt	features	Above pt	Below pt	Tabs cm	Line spacing
part		Medium	28	centered	178	18		
chapter	heading 1	Medium	24		178	18	1	1.15
section	heading 2	SemiBold	14	Bold	12	12	1	1
subsection	heading 3	SemiBold	12	Bold	12	10	1.27	1
subsubsection	heading 4	SemiBold	12	Bold Italic	12	10	1.52	1
paragraph	heading 5	Regular	12	Underline	14		1.78	1
subparagraph	heading 6	Regular	12	Small caps		4	2.03	1
	heading 7	Regular	12	All caps	4	3	2.29	1
	heading 8	Regular	12	centered			2.54	1.5
	heading 9	Regular	12				1.79	1.5

The \LaTeX headings and spacing are done using the `titlesec` package via the macros `\titleformat` and `\titlespacing`, such as:

```
\titleformat{\chapter}
  {\FigtreeFont\fontsize{24}{26}\selectfont}
  {\thechapter}{20pt}{}
\titlespacing{\chapter}{-1.0cm}{178pt}{18pt}
```

Only the chapter heading is outdented, *i.e.*, with a negative hanging indent; all of the others are even with the left margin of the text.

However, as Figtree does **not** have a small caps regular font (or, in fact, any complete font with small caps) it is not possible to set the subparagraph as per the AW-template. Word solves this problem by emitting special formatting to set the lowercase letters in a string as capital letters using a slightly smaller version of the font in use*. An alternative would be to simply swap the features of heading 7 with those of heading 6, *i.e.*, use all caps. At present, I have chosen to use yet another alternative, which is to use a different font that has small caps; see the examples that follow:

2.4.1 For testing

2.4.1.1 For testing

*A similar solution for \LaTeX is described at <https://tex.stackexchange.com/questions/499007/use-fauxsc-if-small-caps-not-available>.

2.4.1.1.1 Some test text in various cases XML, Foo. «An empty paragraph»

A more complete solution would be to design a complete small caps font for Figtree Regular, much as Universitetsservice US-AB (hereafter, simply US-AB) has done for a small subset of Figtree Medium (called Figtree-Medium-SC700, see Section 3.3). However, I have no real desire to be a font designer, so I punted and simply used another sans serif font that includes small caps.

Of course, the best solution would be to select a font that actually has small caps and supports more glyphs (such as Google’s Noto - with its 210 families - see <https://fonts.google.com/noto>). For some comments about the choice of this font, see Section 2.3.4.

3 Cover

The AW-template does not include the cover, title page, and book info pages, as for the third-cycle theses they assume that US-AB will do this. However, for the students and their supervisors, it is important to have at least the title page and book information pages so that they can know which document is which and to ensure that all of the contents of these pages are correct. Therefore, I have developed the cover, title page, and book info pages based upon my template for 1st and 2nd cycle theses - together with an examination of a number of PDF files where these pages were generated by US-AB.

All of the text on the cover is centered. The logo is in `KTH_logo_RGB_bla.png`. The cover is generated from the main \LaTeX file with `\kthcover`.

3.1 Type of thesis

The first line on the cover shows the type of document and the subject, such as “Doctoral Thesis in Information and Communication Technology”. This text is set in Figtree Regular 10pt.

This is based on the values set in the file `custom_configuration.tex` or in the main thesis file, as shown below:

```
\programcode{KTHIKT}
\degreeName{Doctorate}
%\degreeName{Licentiate}
```

```
\subjectArea{Information and Communication Technology}
```

The program codes with their English and Swedish expansions are given in the file `schools_and_programs_3rd_cycle.ins`.

At present, I use the `degreeName` in a case statement to generate the line of text as follows:

```
\begin{center}
\ifswedish
{\FigtreeFont\fontsize{12}{13}\selectfont
\IfEqCase{\@degreeName}{%
{Doctorate}{Doktorsavhandling}%
{Licentiate}{Licentitativhandling}%
}{\typeout{unknown degreeName}}%
\ inom \@subjectArea\\
}

\else
{\FigtreeFont\fontsize{10}{12}\selectfont
\IfEqCase{\@degreeName}{%
{Doctorate}{Doctoral Thesis}%
{Licentiate}{Licentiate Thesis}%
}{\typeout{unknown degreeName}}%
\ in \@subjectArea\\
}
\fi
```

However, I question this handling for the Swedish version of the licentiate, as described in Section 3.1.1. Additionally, the `subjectArea` should generally be set automatically based on the `programmeCode` (as is shown in the `custom_configuration.tex` file). An additional question concerns the handling of Tekn. Dr. and PhD degrees, see Section 3.1.2.

3.1.1 Uncertainty about type of thesis in Swedish

I looked at all of the theses at KTH written in Swedish during 2024 and as of early April 2025. There are only 4 of them: 3 licentiate theses and one doctoral thesis.

Of the three 2024 licentiate theses in Swedish, two refer to the type of thesis as “Licentitativhandling” and one as “Licentiatuppsats”. And two use the connective as “INOM” and one uses “i”.

The licentiate “Koordinatbestämda fastighetsgränser: Analys av förutsättningar och förslag till reform av detsvenska gränssystemet” by Linda Aldén - <https://kth.diva-portal.org/smash/record.jsf?pid=diva2%3A1891543> shows the name of the university under the author’s name in English and the type and subject of the thesis as “Licentiatavhandling inom fastigheter och byggande”. This thesis uses the new cover format. As does the licentiate thesis by Yael Bratel, “Urban rättvisa: Bortom segregation och ojämlikhet – stadsutformning för en rättvis stad” and it states “Licentiatavhandling i Planering och Beslutsanalys” - <https://kth.diva-portal.org/smash/record.jsf?pid=diva2%3A1907707>. The licentiate thesis by Anna Strohmayer, “Vardagslivsrummet och meningsskapandet: Vardagsresande och social hållbarhet i den regionala planeringen i Barkarbystaden” says that it is a “Licentiatuppsats i planering och beslutsanalys” - <https://kth.diva-portal.org/smash/record.jsf?pid=diva2%3A1908492>.

The doctoral thesis by Anna Hrdlicka, “Tidig medborgardialog i svensk detaljplanering: Kan den motiveras?” - <https://kth.diva-portal.org/smash/record.jsf?pid=diva2%3A1853301> - shows the type of thesis and subject as “Doktorsavhandling inom Fastigheter och byggande”. Note that this thesis uses an old style cover.

3.1.2 Uncertainty about the names of doctoral degrees

The official list of all of the degree names at KTH are given at <https://www.kth.se/student/studier/examen/examensregler-1.5685>. For example, it is possible to do a *Tekn. Dr.* degree or a *Doctor of Philosophy* (PhD) degree. How should one distinguish between these two, and where should this distinction be made? I have addressed this by adding a `\degreeModifier` macro and the author sets this in the `custom_configuration.tex` file as shown below:

```
\degreeName{Doctorate}
%\degreeName{Licentiate}

% To support Doctor of Philosophy and Licentiate of
  ↳ Philosophy degrees in addition to Tekn. Dr. and Tekn.
  ↳ Lic. - Uncomment the following line.
%\degreeModifier{Philosophy}
```

One place where this difference is evident is in the description of the defense on the title page.

The template automatically generates the defense description on the title page based on the degree information above and the following:

```
\presentationDateAndTimeISO{2025-04-15 14:00}
\presentationLanguage{eng}
\presentationRoom{via Zoom https://kth-se.zoom.us/j/
  ↪ dddddddddd}
\presentationAddress{Isafjordsgatan 22 (Kistagången 16)}
\presentationCity{Stockholm}
```

The specification of the "swedish" option to the datetime2 package causes a warning message: "Package glossaries Warning: No language module detected for 'swedish'. Language modules need to be installed separately. Please check on CTAN for a bundle called 'glossaries-swedish' or similar." To prevent this error message, you can add the "notranslate" option for the glossaries package. If you are writing in Swedish, the template will change the title of the glossary in \printglossary to the correct Swedish language title *i.e.*, "Lista över akronymer och förkortningar".

3.2 Title, Subtitle, and Author's name

The title is set in Figtree Bold 24pt, the subtitle is set in Figtree SemiBold 14pt, and the author's name is set in all caps using Figtree SemiBold 11.5pt.

3.3 Name of institution under author's name

While trying to make a version of the cover, title page, and book info (*i.e.*, copyright page), I noticed that in a number of the covers (One such thesis is the licentiate "Koordinatbestämda fastighetsgränser: Analys av förutsättningar och förslag till reform av det svenska gränssystemet" by Linda Aldén - <https://kth.diva-portal.org/smash/record.jsf?pid=diva2%3A1891543> shows the name of the university under the author's name in English.) that US-AB has set as "kth royal institute of technology" in Figtree Medium SC700 (Figtree-Medium-SC700) on the cover at 6.3pt. [The font size is based on the size used in the PostScript when printing on A4 paper and when viewed using Adobe Acrobat. Note that the title on the cover is in 24pt, the author 12pt, and the institution 6pt - as measured with my font ruler.]

The embedded font appears as a Type 42 font to encode a subset of a TrueType font. The PostScript code seems to create a GlyphDirectory containing the local ID in the Dict with the ID FCJMUS+Figtree-Medium-SC700 and then adds the required glyphs (/space, /A, /C, /E, /F, /G, /H, /I, /K, /L, /N, /O, /R, /S, /T, /U, /Y) to this directory. Extracting the font using FontForge, I can get a TrueType file DKBYEW+Figtree-Medium-SC700.ttf. This file (of course) only has the required lowercase letters.

I am unsure exactly where the glyphs in the above font originate from or how they were derived. US-AB has said that they produced them using (Adobe) Indesign. The embedded font's copyright string says "Copyright 2022 The Figtree Project Authors (<https://github.com/erikdkennedy/figtree>)". Another possible means of generating them is using FontForge as described at <https://fontforge.org/docs/ui/dialogs/Styles.html>.

On 2025-04-10, I sent the following questions to US-AB:

1. Is there a document specifying the layout of the cover, title page, and copyright page?
2. As far as I know, Figtree does not have a small caps font, as such. Where did you get this font? Why are you using the lowercase string and small caps rather than setting the text as "KTH ROYAL INSTITUTE OF TECHNOLOGY" in Figtree Medium at 6.3pt?
3. Is there a source for the whole Figtree Medium SC700 font as a TrueType font?
4. I know that you will generate the covers and other material for printing in G5 format, but perhaps I can make it so that you can get all of the information that you need for this in machine-readable format. Would you be interested in this?

On 2025-04.11, I got a reply from US-AB that indicated they had done their own small cap font using Indesign. There was no answer to question 1, and a partial answer to questions 2 and 3. They currently have the students fill out a form to request printing for their thesis. From this form, they collect the information that they need. Thus, they did not see any need for the automation of this.

At the present time, I have set the university's name on the cover using Figtree Medium 6.3pt using the uppercase version of the university's name. A potential future alternative is to add the limited embedded font file with small caps (DKBYEW+Figtree-Medium-SC700.ttf) to the Overleaf project and then set the string using this small cap font. However, this is **not** a task that I have given priority to - as US-AB would generally be generating the cover page.

3.4 Cover illustration

Some theses feature an optional cover illustration. Although I have not gotten an answer from the KTH communications unit about the specifications of the cover illustration, I have tried to infer something suitable based on an examination of 32 recent covers with an illustration other than the default..

Due to the lack of a specification for the cover illustration, one should treat this feature of my template as an experimental feature that will be subject to change. Use at your own risk.

3.4.1 Cover images and figures

Two macros are introduced to make this process simpler, see Listing 12. The first (`\coverIllustration`) provides the filename of the illustration to be used. The template includes a `figures/image1.png` file*. This blue rectangular image was taken from the DOCX template for undergraduate theses. The author should replace this file name with the name of the file containing the illustration that they want to use.

NB There are some constraints about what you can put on the cover. If in doubt, query KTH's Communications Department (COM).

The second macro (`\coverIllustrationCredit`) enables the author to acknowledge the creator of the illustration. Here, we will assume that the author has the creator's permission to include the illustration on the cover of their thesis. If the author has created their own illustration, then they do not need to specify any credit, as it is implicitly the work of the author.

*US-AB says they want a jpg or tiff file - see Printing Thesis

Listing 12: Configuring a cover illustration

```
% It is possible to have a cover illustration
\coverIllustration{figures/image1.png}
% if so, the author might acknowledge this or give the
  ↪ copyright information for it with:
\coverIllustrationCredit{A. B. Normal}
```

NB In the `kththesis.cls` file, the author may have to manually adjust the `\imageTopMargin` (default 1 cm) and `\imageBottomMargin` (default 6 mm) parameters. These force a minimum space above and below the illustration. The maximum height is calculated based on the space available below the “KTH ROYAL INSTITUTE OF TECHNOLOGY” line and the physical bottom of the page, less the sum of the image margins. The width option is set to 90% of the `\textwidth` to the `\includegraphics` command. Because the `keepaspectratio` option is specified, the image will be scaled (keeping the aspect ratio) to the first limitation (in width or height) that occurs. The author can adjust the parameters to get the results that they want. For example, you could change it to allow the image to be `\paperwidth` in width; keep in mind that you will need to go outside the width of the text margins (using the `adjustbox` package). If you make the illustration too large, it will appear on a second page and **not** on the cover. If this occurs, you need to reduce the height of the illustration.

The code to do the calculation of space and include graphics is shown in Listing 13.

Listing 13: Configuring a cover illustration

```
\zsaveposy{kthlinebottom} % Save Y-coordinate just after
  ↪ KTH line (bottom of its baseline box)
\ vfill % This will fill up remaining space *before* the fixed
  ↪ \vspace* and image
  % This might not be what you want if you want the
    ↪ image to use up the space.
  % Let's remove \vfill here and let the image height
    ↪ calculation do the work.

\ifx\@coverIllustration\@empty\relax
% If you want to add your own LaTeX-generated cover content
  ↪ : remove the \relax above
% then add your own code here.
```

```

\else
  \newdimen\imageTopMargin\imageTopMargin=1cm
  \newdimen\imageBottomMargin\imageBottomMargin=6mm
  \newdimen\calculatedMaxHeight

  \zifrefundefined{kthlinebottom}{%
    % True: kthlinebottom is undefined (first run)
    \calculatedMaxHeight=100mm % Fallback default max
    ↪ height
    \typeout{LaTeX Warning: Label 'kthlinebottom' undefined
    ↪ . Using default image height. Rerun LaTeX.}
  }{%
    % False: kthlinebottom is defined (subsequent runs)
    \calculatedMaxHeight=\dimexpr \zposy{kthlinebottom}sp
    ↪ - \imageTopMargin - \imageBottomMargin \relax
    \ifdim\calculatedMaxHeight<10pt \calculatedMaxHeight
    ↪ =10pt \fi % Min sensible height
  }%

  \par\vspace*{\imageTopMargin}

  \begin{center}
  \IfFileExists{\@coverIllustration}{%
    \noindent\includegraphics[
      width=0.9\textwidth,
      height=\calculatedMaxHeight,
      keepaspectratio
    ]{\@coverIllustration}%
  }{}%
  \end{center}
\fi

```

Potentially, an author could implement a “Bottom-Bleed Layout” with the following characteristics:

- The image starts at a calculated vertical position safely below the KTH logo’s required keep-out zone (the bottom of the logo + 1/4 of its height).
- Then the image extends to the full width of the page and down to the bottom edge. Thus, the title, subtitle, author’s name, and university name are overlaid directly on top of this image.

The primary challenge of this layout is that the author must select an image that allows the overlaid text to remain highly readable.

This sort of cover illustration could be very impactful, but it is not something for the faint of heart. It could also require consideration of the printer's trim margins.

Because the computation of the available space is not available until the page has been output, you will need to rerun \LaTeX to use the value. The y-position data is stored in the `output.aux` file.

3.4.2 Draw and make your own cover illustration in \LaTeX

It is also possible to generate your own cover illustration using \LaTeX , for example, using Tikz or another package. You can also include equations. Simply replace the `\relax` in the line `\ifx \@coverIllustration \@empty \relax` in the code shown in Listing 13 with your code to generate the illustration that you want. Alternatively, you can generate the illustration by running your code in another \LaTeX project and then just include the results as an image (using the above method). You will probably need to give the graphics to US-AB as an image file.

4 Title page

All of the text on the cover is set flush left. The title page is generated from the main \LaTeX file with `\titlepage`. The fonts and font sizes used for the title, subtitle, and author's names are the same as on the cover.

The defense description is set in 8pt Figtree Regular and placed 68pt below the author's name.

At the bottom of the page, set in 8pt Figtree Regular, is some information about the thesis. The first line is the type of degree and subject area (the same as the cover). The bottom two lines are (i) the institution name and (ii) the city and country of the institution, followed by the year of the thesis. These fields are set in either English or Swedish (based on the author's choice of the language of the thesis).

For my version of the template, I have also included a line (or lines) for the supervisors and for the alternative title and subtitle. For example:

```
Doctoral Thesis in Information and Communication Technology
Supervisors: A. Busy Supervisor, Another Busy Supervisor,
  ↪ Third Busy Supervisor
Swedish title: Detta är den svenska översättningen av
  ↪ titeln
Swedish subtitle: Detta är den svenska översättningen av
  ↪ undertiteln
KTH Royal Institute of Technology
Stockholm, Sweden 2025
```

By adding the extra lines in the middle, I've basically kept the format - while providing a way to add the extra metadata (needed for DiVA) in a visible form.

5 Book info page

All of the text on this page is set flush left at the bottom of the page in Figtree Regular 8pt.

There are two versions of this page: `\bookinfopage` and `\bookinfopageCC` (for a Creative Commons license). Each generates the top part of the text at the bottom of the page.

Optionally, there is a 1ex space before and after a line that acknowledges the copyright/author of the cover illustration. For example, the author might acknowledge this with:

```
\coverIllustrationCredit{A. B. Normal}
```

producing in a thesis in English:

```
Cover illustration: A. B. Normal
```

or in a thesis in Swedish:

```
Omslagsillustration: A. B. Normal
```

Next, there is a 1ex space before the TRITA number and ISBN numbers are given (one line for each).

Next, there is a 1ex space before information about the printer is given, for example as:

Printed by: Universitetsservice US-AB, Sweden 2025

The `printedBy` is set in the thesis with the macro:

```
\printedBy{Universitetsservice US-AB, Sweden 2025}
```

Alternatively, a Swedish version of the thesis that includes the following in the thesis:

```
\printedBy{Universitetsservice US-AB, Stockholm 2025}
```

will result in:

Tryck: Universitetsservice US-AB, Stockholm 2025

For both `\coverIllustrationCredit` and `\printedBy`, the default value is empty. If the string is empty, then nothing is printed.

6 Back Cover

The AW-template does not specify a back cover, as it leaves this up to US-AB. I have used the same `\kthbackcover`^o as used in my earlier template, but (i) added the ISBN number and (ii) moved the place and year to the top of the page (with the same white space above it as to the left of it).

7 Abstracts and keywords

One of the important features of the template is the ability to have abstracts and keywords in a number of different languages - while at the same time making it easier to extract the abstracts and keywords for input to DiVA.

To provide a heading consistent with the AW-template, I have changed the abstract environment to use the `chapter*` rather than `section*` heading style:

```
\renewenvironment{abstract}{\chapter*{\abstractname}}
```

As these headings are unnumbered, there needs to be a change in the spacing for the starred version of the spacing for a chapter, by using `\titlespacing*` as follows:

```
\titlespacing*{\chapter}{0.0cm}{178pt}{18pt}
```

NB As this heading style takes up a lot of vertical space on a page, many abstracts will go from a single page to two (or more) pages. I think that this is a poor design choice as it makes it harder for a reader (of the printed or PDF versions) to get a quick overview of the thesis and thus likely decreases the probability that they read the rest of the abstract. Alternatively, it will be a forcing function to cause authors to shorten their abstracts so that the abstract and keywords can fit in the remaining space on the page!

Note that some subject areas commonly use structured abstracts, see the section “Structured abstracts” of `README_3rd_cycle_author.tex`.

7.1 Language and font usage in Abstracts

In order to easily support abstracts in multiple languages, this template uses the Babel package. This package enables the user to indicate which language a block or string is written in using the name of the language in lowercase. Listing 14 uses the `abstract_french.tex` file as an example. The file begins with `\selectlanguage{french}`. It is important to note that the `\cleardoublepage` is before the end of the region that is going to be in French. This is necessary because the running heading uses the French name for the abstract/summary. The running heading uses the “mark” given by `\abstractname`. For each language that babel supports, there is a `language.ldf` file that defines a number of values, such as `\abstractname`. However, I have chosen to have the user provide the name via an explicit directive of the form: `\setlocalecaption{french}{abstract}{Résumé}`. This has the advantage of allowing the user to easily change the name of the “abstract” to be the correct term for a *summary* in the language when what is given is actually a summary and not an abstract, *i.e.*, the text is not necessarily a translation of the abstract in the language of the thesis.

Additionally, there is no name defined for the keywords heading, so this has to be provided by you as an author using the `\keywordHeading{}` command.

Listing 14: Structure of `abstract_french.tex`

```
\selectlanguage{french}
\setlocalecaption{french}{abstract}{Résumé}
\begin{abstract}
  \markboth{\abstractname}{}
\begin{ThesisAbstract}{fre}
Résumé en français.
```

```

\end{ThesisAbstract}

\keywordHeading{Mots-clés}
\begin{ThesisKeywords}{fre}
5-6 mots-clés
\end{ThesisKeywords}
\end{abstract}
\cleardoublepage

```

Part of the functionality of the selection of a language is to change the hyphenation rules to those for the selected language and to introduce new commands of the form *language*text{} and *languagesf*text{} that can be used to switch the font used to output the content in this language. These new commands are automatically invoked when a language is selected.

Listing 15 shows an example of configuring three fonts (a serif font, a sans serif font, and a monospacing font) for use with Chinese. When the author selects the language, they specify either *chinese-simplified* or *chinese-traditional*.

Listing 15: Font configuration for Chinese

```

\babelprovide[import, onchar=ids fonts]{chinese-simplified}
\babelfont[chinese-simplified]{rm}{Noto Serif CJK SC}
\babelfont[chinese-simplified]{sf}{Noto Sans CJK SC}
\babelfont[chinese-simplified]{tt}{Noto Sans Mono CJK SC}

\babelfont[chinese-traditional]{rm}{Noto Serif CJK TC}
\babelfont[chinese-traditional]{sf}{Noto Sans CJK TC}
\babelfont[chinese-traditional]{tt}{Noto Sans Mono CJK TC}

```

As a result, the contents will be set using these fonts. This also means that the running heading in the language of the abstract will use the correct font! However, not all fonts contain the letters that appear in lowercase Roman numerals as used for the page numbers. To address this problem, a sans serif font has been selected to be used for page numbering, see Listing 16.

Listing 16: Font configuration for page numbering

```

\newfontfamily\pageNumberFont{TeX Gyre Heros}

```

In this template, the sans serif font (used in the body of the text) has been selected for the page number. Potentially, this could have been Figtree. However, as noted previously for many languages, Figtree does not have the characters needed,

so the rest of the running heading has to be set in the appropriate font for the language that is being used. When the language used does not require a font different from that used for the main body of the thesis, the default sans serif font is used for the running heading. For consistency, I have used the same font for the page numbering. This means that there will potentially be some font dissonance in these running headings (*e.g.*, with Chinese, Greek, Hebrew, Hindi, Japanese, Russian, and Vietnamese). However, I think that this dissonance is minimal as (i) I have used a sans serif font from the same font family for each of these languages and (ii) this same font is being used when setting the `abstractname`. The alternative would be to use the numbering scheme of the specific language, but I think that this would be unnecessarily complex to implement (especially when it comes to lowercase Roman numerals and bidirectional typesetting).

7.2 Keywords in Abstracts

The AW-template says that the heading “Keywords” in the abstract should be set in Georgia Bold 12pt. Personally, I find this choice by the AW-template a bit ugly as one is using a serif font in what is functionally a heading – when all of the other headings are in sans serif. Additionally, as noted earlier, Georgia Bold is a proprietary font.

I have added a macro to handle the keywords header in the abstract, so rather than saying:

```
\subsection*{Keywords}
```

one uses the `\keywordHeading` command. This command is defined as:

```
\newcommand{\keywordHeading}[1]{\vspace{24pt}\noindent{\rmfamily\fontsize{12}{14}\fontseries{b}\selectfont{#1}}\par}
```

In this way, if others also find it ugly, they can simply replace `\keywordHeading{x}` with `\subsection*{x}` or just change the definition of the macro to:

```
\newcommand{\keywordHeading}[1]{\subsection*{#1}}
```

7.3 Tables and images in abstracts

This template and the tools that I have written to help enter the metadata into DiVA do **not** support tables and figures in abstracts.

As an abstract in DiVA can contain HTML code, it is technically possible to make tables and include figures in a DiVA abstract. The problems are (i) that I do not know a general means of transforming a table from LaTeX to HTML, and (ii) I do not know of a good way of passing the image (or images) that might be in a LaTeX abstract (via tools) to DiVA. The second problem might be addressed by attaching the image files to the PDF and adding code to the generated HTML to refer to these images. One problem with this is that the images would probably need to be uploaded as supplemental/supporting material, and then there would need to be some tool to update the abstract to refer to this uploaded file.

In a recent correction that I suggested for a thesis abstract in DiVA, I manually created the table in HTML to match the table that was in the abstract in the printed thesis.

The DiVA administrator who entered the thesis into DiVA had not put *any* of the abstract in, but simply put "See file" in the abstract field!

7.4 Graphical or visual abstracts

KI has an excellent page about graphical abstracts, see Graphical abstracts. At present, this template does **not** provide any special support for graphical abstracts. One can use the usual mechanisms to include a figure in the abstract; however, see Section 7.3.

I am unsure (i) how to deal with such figures with respect to facilitating their inclusion in DiVA (Could it be uploaded separately as supplemental material?), and (ii) it is unclear to me whether this graphical abstract would be placed before or after the keywords in the LaTeX file. This will require some further evaluation.

Recently, I helped create a graphical abstract (for a journal paper) using `tikz`. This method might have some advantages in terms of accessibility if the `tikz` source code were available to a (screen) reader. This might be done by including the source code in a `alt` tag.

8 Table of contents and its placement

Following the page order described in the *Chicago Manual of Style*, the table of contents is located before the lists of figures, tables, abbreviations, *etc.* In contrast, the AW-template places the table of contents after these lists. I see no reason to

follow the page ordering of the AW-template; hence, I have placed the table of contents after the acknowledgments and before the various lists. In this way, the list-like front matter is all together, and the text-like front matter is also together*.

Note that the AW-template sets the heading of the table of contents as all caps in 22pt. However, as noted earlier, I see no reason to do so, especially as this is *not* in keeping with the other *front matter* pages. Additionally, I set it in 24pt to match the other preface page headings.

If someone really wants the table of contents heading in all caps, then one can add the command `\MakeUppercase` as shown below:

```
\renewcommand{\cfttoctitlefont}{\FigtreeFont\fontsize
  ↪ {24}{26}\fontseries{md}\selectfont\MakeUppercase}
\tableofcontents
```

I have used the `tocloft` package to change the font and font size used for the entries in the table of contents and the page numbers in the table of contents.

9 The List of Figures, List of Tables, Listings, etc.

The AW-template places these lists after the table of contents and numbers them starting from the first page after the table of contents. However, this does not make sense as these pages are part of the front matter and not part of the body of the thesis.

NB Note that the words “Figures” and “Tables” are capitalized. Saying “List of Listings” would seem redundant; hence, I have simply titled it “Listings”.

The AW-template, seems to ignore the fact that it is often very useful to number figures, tables, listings with a hierarchical label *within* the relevant section. For example, having a “Figure 2.2”, a “Table D.1”, and Listing “E.4”. Additionally, there is no need to name the entry in the list of figures, as “Figure 2.2”, it can simply be “2.2” with its description - as “Figure” is common to all of the entries in the list of figures.

*At Karolinska Institutet, they place the acknowledgments after the *Points of Perspective* and the *Declaration about the use of Generative AI*, and the *References* - see <https://staff.ki.se/doctoral-education/time-to-defend-your-thesis/content-of-the-thesis>.

Note that the entries in the table of contents in the AW-template are misleading, as they contain the description of the setting for the heading and **not** for the entry in the table of contents! From a reader’s point of view, it would have been better to add the formatting information as comments in the DOCX document. Moreover, it would have been better to systematically name the paragraph styles that are used. Additionally, as the template is written in English, all of the paragraph style names (and character style names) should be in English.

I am not sure why the AW-template specifies that the entries in these tables are set using Georgia Regular 9pt. I expect that this will be unreadable for many readers. It makes much more sense to set these as the same font and font size as used in the body of the thesis. Therefore, I have used the serifed font and size used in the body of the thesis.

It is also useful to know that in \LaTeX it is possible to specify a “short” description that is to be used in the List of “X” - just as one can do for headings that appear in the table of contents. The use of the optional short form enables a short description in the table of contents or List of “X”, while having a (very) long heading or description.

10 List of acronyms and abbreviations

To get the page heading in the correct place, set `section=chapter` in the options to the `glossaries-extra` package:

```
\usepackage[acronym, style=super, section=chapter, toc=false
↪ , nonumberlist, nomain, nopostdot=true, notranslate]{
↪ glossaries-extra}
```

11 List of Symbols Used

An optional section that is useful in some theses is a “List of Symbols Used”, *i.e.*, nomenclature. This list should indicate where a given symbol is defined. To have such a table included, one simply enables this option in the `\documentclass`.

12 List of publications

The AW-template has a page listing all of the publications included in the thesis, with an option for additional scientific publications that are not included in the thesis. While the AW-template says that these additional publications should be placed on a new page, this does not make much sense to me, since either this would be on the back side of the list of publications page or on the next odd page. Additionally, it is likely to be rare that the list (when listing *only titles*) of publications included in the thesis would exceed one page.

Stylistically, having such a list as a separate page does not make a lot of sense for a *reader of the thesis*, as the list of publications and the author's contributions are generally given in the body of the thesis. If the purpose of this list is to facilitate a *DiVA administrator or the student* entering a list of the *included publications* in DiVA, then the list should list the publications in their full reference format, as even though the DiVA page for the thesis will simply list them by title – each of these titles has a hyperlink to a DiVA page for the publication. Without having the full reference in this list, what is a suitable means of helping the reader find the full reference to the item being described? This template proposes a means of having a list of publications while collecting the relevant information about the included papers as part of the process of producing the divider pages.

Increasingly, there are peer-reviewed artifacts, in addition to patents, along with other scientific output (datasets, patent applications, posters, reports, *etc.*). Therefore, I have expanded the list of publications to be able to include numbered lists: `ListOfPapers`, `ListOfPosters`, `ListOfPatents`, `ListOfReports`, `ListOfPatentApplications`, `ListOfArtifacts`, and `ListOfDatasets`. You can create groups of publications as shown in the “List of Publications”.

The basic form for each of these new lists is illustrated in the following code for `ListOfPapers`:

```
\newlist{ListOfPapers}{enumerate}{1}
\setlist[ListOfPapers]{
  leftmargin=*,
  label={Paper \Alph*},
  ref={Paper \Alph*},
  resume=listOfPapers,
  itemsep=0em,
  first=\raggedright
}
```

These lists use the `enumitem` package. The labels are automatically set for the type of publication, along with a reference to it. This reference can be used when making the tabs on the divider pages (with `\ref*{paper:A}`) and when writing about the publication (`\ref{paper:A}`). The first form does *not* have a hyperlink or coloring of the hyperlink, while the second form will. The `resume` has been set so that the numbering for a given type of publication continues when this environment is used again. The items are set ragged right to avoid hyphenation and justification of the text.

13 Chapters within the thesis

The names of the chapters in the AW-template are best ignored, as while there are some theses that might be organized this way - **not** all theses will have these chapters and organization.

14 Paragraph formatting within the thesis body

In Section 2.1 of the AW-template there is an example of a bulleted list with a description of the indent and font size to be used. I am not sure that it is worth trying to follow these paragraph-level styles in my template - as I am not sure that they are better than what the template already does.

15 References

The AW-template uses the American Psychological Association (APA) reference style* and specifies that the entries are to be formatted in Georgia Regular 11pt. In contrast, this template lets the author choose the citation and reference style. Additionally, it sets the references in the same font size as used for the body of the text (as I see no reason to reduce the point size of the text in each of the references by 1 pt).

The template sets the title of the reference page to “References” using:

```
\renewcommand{\bibname}{References}
```

*I suspect that this choice is because this is one of the reference formats supported by Word.

When using biblatex, the following is used to change the heading for the references page to use the `chapter*` format:

```
\defbibheading{bibliography}[\bibname]{%
  \chapter*{\#1}%
}
```

Note that, unlike the AW-template, this template uses an unnumbered chapter heading for the references (as the references are **not** a chapter).

16 Appendices

The AW-template provides no guidance about appendices. In contrast, this template numbers the appendices with capital letters, starting with 'A'.

17 Included papers

The AW-template provides no guidance about how to include publications or how the divider pages should be formatted. In this template, section “Including the PDF of a publication” of `README_3rd_cycle_author.tex` shows how to include PDF files of publications, while Section 18 describes and illustrates how to make divider pages.

18 Divider pages

It is highly desirable for a compilation thesis to have divider pages inserted before each of the included publications. My aim is to automate much of the generation of such pages.

Looking at the printed thesis *Data verification for GNSS systems and protection of GNSS services* by Marco Spanghero, URN: urn:nbn:se:kth:diva-361272, ISBN: 978-91-8106-231-1 (print), I found that the positioning of the tabs follows (roughly) the parameters shown in Listing 17.

Listing 17: Parameters used with myfancytab macro

```

\fancytabsWidth{5cm} % width of tabs
\fancytabsHeight{1.9cm} % height of tab
\fancytabsCount{10} % maximum tab positions per page
\fancytabsGap{0.5cm} % spacing between tabs
\fancytabsTop{1.8cm} % space above first tab
\fancytabsTextHPos{0.25} % fraction of tab width for start
    ↪ of text
\fancytabsStyle{\FigtreeFont\fontsize{24}{30}} % font to use
    ↪ for text on the tab

```

18.1 How to make divider pages

The `fancytabs` package is used with the parameters shown in Listing 17 and a customized `myfancytab` macro. The definition of this macro is in the `examplethesis.tex` file. The arguments to the macro are LEFT/RIGHT, the text to be shown in white on a black tab, the index of the tab (starting at 1) the bibliographic tab for the entry to be used, and the name of the bibliography file that the bibentry can be found in. The end of the `examplethesis.tex` file shows examples of tabs for different types of publications and how to include the PDF of the included publications

Note that the `myfancytab` macro retains the same initial arguments as the `fancytab` macro, so that if an author wanted to have *very* fancy tabs, they could readily modify the `myfancytab` macro.

The two additional arguments to the `myfancytab` macro were made based upon a request from one of the KTH librarians* to make it easier for people to add the publications that they have included in DiVA before they register their thesis in DiVA. Therefore, as a side effect of processing the divider pages `myfancytab` emits information into a file called `citedtags.bib`. In the case of `bibtex`, each of the bib entries for the included publication is inserted into the file. Unfortunately, since `biblatex` can search a number of bibliography files for an entry and it has no means to provide just the bibliography file where the entry was found or to return the bib entry itself, it has to use the separate `Paper_A.bib`, etc. bib files to provide these entries - just the same as for `bibtex`. In the case of `biblatex`, the `myfancytab` macro also writes a fake bibentry with a tag of the form `fakebibN` where `N` is the integer index of the tab number. For some examples,

*Michael Andersson

see Listing 18. Alternatively, one might just include all of the bibliography files that were available. The idea is that the `citedtags.bib` could later be processed by an external script that could check whether the publication is already in DiVA and if not, then offer to add it to DiVA for the user. Note that writing such a script remains for future work and the availability of the new Cora API that will be used for the new version of DiVA*.

*Expected to be used by KTH in late Spring 2026

Listing 18: Examples of fake bibliographic entries

```

@misc{fakebib1, cited="ioannidis\_coherent\_1991" bib="
  ↳ Included\_publications/Paper\_A"}
@article{ioannidis\_coherent\_1991\_pub, title = {Coherent
  ↳ {File} {Distribution} {Protocol}}, volume = {RFC 1235
  ↳ (Experimental)}, issn = {2070-1721}, url = {http://
  ↳ www.rfc-editor.org/rfc/rfc1235.txt}, doi = {10.17487/
  ↳ RFC1235}, abstract = {This memo describes the
  ↳ Coherent File Distribution Protocol (CFDP). This is
  ↳ an Experimental Protocol for the Internet community.
  ↳ It does not specify an Internet standard.}, journal =
  ↳ {Internet Request for Comments}, author = {Ioannidis
  ↳ , J. and Maguire, G.}, month = jun, year = {1991} }
@misc{fakebib2, cited="maguire\_jr\_new\_2014" bib="
  ↳ Included\_publications/Paper\_B"}
@article{maguire\_jr\_new\_2014\_pub, title = {A {New} {
  ↳ Automated} {Way} to {Measure} {Polyethylene} {Wear}
  ↳ in {THA} {Using} a {High} {Resolution} {CT} {Scanner
  ↳ }: {Method} and {Analysis}}, volume = {2014}, issn =
  ↳ {2356-6140, 1537-744X}, shorttitle = {A {New} {
  ↳ Automated} {Way} to {Measure} {Polyethylene} {Wear}
  ↳ in {THA} {Using} a {High} {Resolution} {CT} {Scanner
  ↳ }}, url = {http://www.hindawi.com/journals/tswj
  ↳ /2014/528407/}, doi = {10.1155/2014/528407}, abstract
  ↳ = {As the most advantageous total hip arthroplasty (
  ↳ THA) operation is the first, timely replacement of
  ↳ only the liner is socially and economically important
  ↳ because the utilization of THA is increasing as
  ↳ younger and more active patients are receiving implants
  ↳ and they are living longer. Automatic algorithms were
  ↳ developed to infer liner wear by estimating the separation
  ↳ between the acetabular cup and femoral component head
  ↳ given a computed tomography (CT) volume. Two series of
  ↳ CT volumes of a hip phantom were acquired with the femoral
  ↳ component head placed at 14 different positions relative
  ↳ to the acetabular cup. The mean and standard deviation
  ↳ (SD) of the diameter of the acetabular cup and femoral
  ↳ component head, in addition to the range of error in
  ↳ the expected wear values and the repeatability of all
  ↳ the measurements, were calculated. The algorithms resulted

```

```

↪ in a mean ( $\pm$ SD) for the diameter of the acetabular cup
↪ of 54.21 ( $\pm$ 0.011) mm and for the femoral component head
↪ of 22.09 ( $\pm$ 0.02) mm. The wear error was  $\pm$ 0.1mm and the
↪ repeatability was 0.077mm. This approach is applicable
↪ clinically as it utilizes readily available computed
↪ tomography imaging systems and requires only five minutes
↪ of human interaction.}, language = {english}, journal
↪ = {The Scientific World Journal}, author = {Maguire Jr
↪ ., Gerald Q. and Noz, Marilyn E. and Olivecrona, Henrik
↪ and Zeleznik, Michael P. and Weidenhielm, Lars}, year
↪ = {2014}, pages = {1--9} }

```

19 Writing additional files

As described in the previous section, there is a `citedtags.bib` being written as a side effect of the `myfancytab` macro. To make it easier to open, close, and write to such files, a number of new commands were added to the `kththesis.cls` class file. These commands are shown in Listing 19.

Listing 19: File I/O macros

```

% Define some functions to make it easier to open, close,
↪ and write to the file if it is open, while generating
↪ errors if the file is not open
\newcommand{\FileOpen}[2]{%
% arg 1 is a filehandle as a string
% arg 2 is a filename
  \expandafter\newwrite\csname#1\endcsname%
  \expandafter\immediate\expandafter\openout\csname#1\endcsname
  ↪ #2%
}

\newcommand{\FileClose}[1]{%
% arg 1 is a filehandle as a string
  \expandafter\immediate\expandafter\closeout\csname#1\endcsname%
  \expandafter\let\csname#1\endcsname\undefined % Mark the
  ↪ handle as undefined after closing
}

\newcommand{\WriteIfFileOpen}[2]{%

```

```
% arg 1 is a filehandle
% arg 2 is content to be written to a file
\expandafter\ifcsname\string#1\endcsname
  % The control sequence for the file handle exists
  \immediate\write\csname #1\endcsname{#2}%
\else
  % The control sequence for the file handle is not defined
  \PackageWarning{mypackage}{File handle '#1' is not
    ↪ defined (or closed).}%
\fi
}
```

While the above macros might seem complex due to the many uses of `\expandafter` - they use the same mechanism to take a text string as a filehandle and use this with the underlying `\newwrite`, `\openout`, `\closeout`, and `\write` commands. The `\immediate` command is used to force the operation to occur immediately rather than when a page is being output. A very subtle twist to all of this code is the testing for the filehandle being defined as a command sequence and the redefinition of the command sequence to be undefined when the file is closed. This twist enables the code to generate a warning if the user tries to write to the file before it is opened or after it is closed. The format of such a warning is shown in Listing 20.

Listing 20: Examples of warning when using a file that is not open

```
Package kththesis Warning: File handle 'citedtagsfile' is
  ↪ not defined (or closed). on input line xxxx.
```

Using these new macros, one opens the `citedtags.bib` file before generating the fancytabs and including the PDF files as shown in Listing 21 and then closing the file after having included all of the publications as shown in Listing 22.

Listing 21: Opening a file

```
\FileOpen{citedtagsfile}{citedtags.bib}
```

Listing 22: Closing a file

```
\FileClose{citedtagsfile}
```

20 Posting

In conjunction with the posting (or “nailing”) of the thesis, there is a need to produce an announcement with details of the thesis and the details of the time and place of the public defense. However, as the required information now needs to be on the title page, there is no longer a need to produce a separate document (spikblad) for this*.

The `fordiva.json` file could be used to produce an announcement (ie calendar event) via the KTH Calendar. Potentially, this could be automated. Who would be responsible for this?

Acronyms

DiVA	Digitala Vetenskapliga Arkivet
DOCX	Microsoft Word Open XML Document
EMU	English Metric Unit
KTH	KTH Royal Institute of Technology
OOXML	ISO/IEC-29500 Office Open XML File Formats
OS	operating system
XML	Extensible Markup Language

*See Avskaffa spikblad för licentiatuppsatser och doktorsavhandlingar Dnr V-2017 - Fakultetsrådet protokoll 1/18, 2018-02-07.

References

- [1] ISO/IEC JTC 1, Information technology, Subcommittee SC 34, Document description and processing languages, “Information technology — document description and processing languages — office open xml file formats; part 1: Fundamentals and markup language reference,” International Organization for Standardization and International Electrotechnical Commission, ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, Standard ISO/IEC 29500-1:2016, 2016, p. 5024.
- [2] Alfred Spector, Peter Norvig, and Slav Petrov, “Google’s hybrid approach to research,” *Commun. ACM*, vol. 55, no. 7, pp. 34–37, Jul. 2012, issn: 0001-0782. doi: 10.1145/2209249.2209262. [Online]. Available: <https://doi.org/10.1145/2209249.2209262>.