



# **Guidelines for Writing a Bachelor's or Master's Thesis**

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I would like to take this opportunity to thank all my colleagues who knowingly or unknowingly participated in the creation of these guidelines. Especially to all co-authors for their care and immeasurable patience in processing the continuous changes, in particular to Jan Koprnický for preparing the guidelines in L<sup>A</sup>T<sub>E</sub>X and Pavel Satrapa for developing the *tul.sty* style file and *tulthesis.cls* class for L<sup>A</sup>T<sub>E</sub>X [16].

At the time of the revision of the guidelines, there was an extensive discussion on whether and how to use artificial intelligence (AI) for the preparation of various texts (Bachelor's and Master's theses not excluded) and how to refer to the use of these tools. In this context, we can confidently state that no AI was used in the revision of the guidelines.

Zdeněk Plíva

## Abstrakt

Tato skripta shrnují požadavky platných norem, předpisů a vyhlášek na tvorbu závěrečných prací na Technické univerzitě v Liberci. Jsou určena především jako vodítko pro tvorbu bakalářské a diplomové práce studentů Fakulty mechatroniky, informatiky a mezioborových studií. S výjimkou loga fakulty jsou využitelná i pro jiné součásti univerzity. Kromě formálních požadavků na jednotlivé kapitoly závěrečných prací je součástí skript i přehled základních typografických pravidel, shrnutí zásad práce s vkládanými objekty (ilustracemi, tabulkami, grafy, vzorci atp.) a stručný postup pro práci s PDF soubory.

### **Klíčová slova:**

bakalářská práce, diplomová práce, formální požadavky na textové zprávy, typografie, práce se soubory PDF

## Abstract

This textbook comprises a summary of requirements specified by standards, regulations and notices in effect that apply to writing final reports at the Technical University of Liberec. Its principal purpose is to provide guidance for the students at the Faculty of Mechatronics, Informatics, and Interdisciplinary Studies to writing a bachelor or master thesis. Except the faculty logo, it may be utilized for other parts of the university, too. Besides the formal requirements for each chapter in a final paper, the textbook further overviews basic typographic rules, principles of handling pasted objects as well as a brief description of PDF file operations.

### **Key words:**

bachelor thesis, master thesis, formal requirements for text reports, typography, PDF file operations

# Contents

- Foreword 10
  
- 1 Formal Requirements of the Thesis 11**
  - 1.1 A Few Introductory Words . . . . . 11
  - 1.2 Binding . . . . . 11
  - 1.3 Paper . . . . . 12
  - 1.4 Page Numbers . . . . . 12
  - 1.5 Chapter Numbers . . . . . 13
  - 1.6 Text Formatting . . . . . 13
    - 1.6.1 Paragraphs . . . . . 13
    - 1.6.2 Fonts . . . . . 14
  
- 2 Report Structure 16**
  - 2.1 Front Matter . . . . . 16
    - 2.1.1 Front Board and its Pastedown (pages one and two of the cover) 16
    - 2.1.2 Title Page . . . . . 17
    - 2.1.3 Thesis Assignment . . . . . 17
    - 2.1.4 Declaration . . . . . 18
    - 2.1.5 Acknowledgements . . . . . 18
    - 2.1.6 Abstract . . . . . 18
    - 2.1.7 Table of Contents . . . . . 19
    - 2.1.8 List of Symbols, Abbreviations, and Terms . . . . . 19
  - 2.2 Body of the Report . . . . . 19
    - 2.2.1 Core of the Report . . . . . 19
    - 2.2.2 Conclusions and Recommendations . . . . . 20
    - 2.2.3 Bibliography . . . . . 20
    - 2.2.4 References in the Text . . . . . 21

2.3	Appendixes and Final Parts . . . . .	23
2.3.1	Text Appendixes . . . . .	23
2.3.2	Back Board and Pastedown . . . . .	24
2.3.3	Spine . . . . .	24
2.4	General Comments on the Final Editing of Documents . . . . .	24
2.4.1	Typographic Principles . . . . .	24
2.4.2	Examples of Front Matter Pages . . . . .	25
2.4.3	Generation of PDF Files . . . . .	25
2.4.4	Text Editors, Word Processors, Desktop Publishing . . . . .	25
<b>3</b>	<b>Object Insertion Rules</b>	<b>27</b>
3.1	Illustrations . . . . .	27
3.1.1	Figures . . . . .	28
3.1.2	Graphs . . . . .	28
3.1.3	State Diagrams and Flowcharts . . . . .	30
3.1.4	Molecules and Chemical Compounds . . . . .	31
3.1.5	Diagrams and Drawings . . . . .	31
3.2	Tables . . . . .	32
3.3	Formulas . . . . .	32
3.4	Inserting Source Codes . . . . .	33
3.4.1	Source Codes in the Form of an Image . . . . .	33
3.4.2	Source Codes in the Form of Text . . . . .	34
3.5	Cross References . . . . .	36
	<b>Bibliography</b>	<b>37</b>
	<b>Appendixes</b>	<b>40</b>
<b>A</b>	<b>Appearance of the Front Board of the Final Thesis in Czech</b>	<b>40</b>
<b>B</b>	<b>Appearance of the Front Board of the Final Thesis in English</b>	<b>41</b>

<b>C</b>	<b>Title Pages of the Thesis Generated from IS STAG</b>	<b>42</b>
C.1	Title Page of the Thesis (Example) . . . . .	42
C.2	Thesis Assignment – Points of the Assignment (Example) . . . . .	43
C.3	Thesis Assignment – Details and Bibliography (Example) . . . . .	44
C.4	Bachelor Thesis Declaration . . . . .	45
C.5	Master Thesis Declaration . . . . .	46
<b>D</b>	<b>Text Formatting Principles</b>	<b>47</b>
<b>E</b>	<b>Peculiarities of English Text Formatting</b>	<b>60</b>
E.1	Czech Typographic Conventions . . . . .	60
E.2	Writing the Title in English . . . . .	60
E.3	English Abstract and Keywords within Czech Thesis . . . . .	60
E.4	Writing the Whole Thesis in English . . . . .	61
<b>F</b>	<b>Options for PDF Conversion</b>	<b>62</b>
F.1	Options for PDF Conversion . . . . .	63
F.2	Options for Merging and Splitting PDF files . . . . .	63
F.2.1	Use of Online Services . . . . .	63
F.2.2	Specialised Desktop Applications . . . . .	63
F.2.3	Use of L <sup>A</sup> T <sub>E</sub> X Options . . . . .	64
F.2.4	Virtual PDF Printers . . . . .	64
F.3	PDF in More Detail . . . . .	64

# List of Figures

- 1 The logo of the Technical University of Liberec in three graphic formats (Czech version) . . . . . 28
- 2 Additional symbol of the Technical University of Liberec in three graphic formats . . . . . 28
- 3 Example of a state diagram (RS flip-flop) . . . . . 30
- 4 Example of a flowchart (deciding which system to use to write structured text) . . . . . 31
- 5 Caffeine and water molecule . . . . . 31

# List of Graphs

- 1 Example of a line chart . . . . . 29
- 2 Example of a bar chart . . . . . 29
- 3 Example of pie chart . . . . . 30



## List of Abbreviations

ASCII	American Standard Code for Information Interchange
CMYK	Cyan Magenta Yellow Key
ČSN	Czech Technical Standard
ČSN ISO	Designation of Standards Adopted from ISO
DOC, DOCX	Document File Format (MS Word)
DPI	Dots Per Inch
DTP	Desktop Publishing
FM	Faculty of Mechatronics, Informatics and Interdisciplinary Studies
FBD	Function Block Diagram
HTML	HyperText Markup Language
IS STAG	Study agenda information system
ISBN	International Standard Book Number
ISO	International Organization for Standardization
ISSN	International Standard Serial Number
JPG	Picture data format, lossy compression (proposed by the Joint Photographic Experts Group)
L <sup>A</sup> T <sub>E</sub> X	Typographic system, set of macros for the T <sub>E</sub> X
LD	Ladder Diagram
LO Writer	LibreOffice Writer
LZW	Lempel Ziv Welch
MS Word	Microsoft Word
OCR	Optical Character Recognition
ODT	Open Document Text
PDF	Portable Document Format
RGB	Red Green Blue
RTF	Rich Text Format
SI	Système International d'Unités, international system of units
T <sub>E</sub> X	program for computer typesetting
TEX	L <sup>A</sup> T <sub>E</sub> Xsystem document format
TUL	Technical University of Liberec
XMP	Extensible Metadata Platform
WYSIWYG	What You See Is What You Get
WYSIWYM	What You See Is What You Mean

## Foreword

The aim of this document is to provide guidance for editing Bachelor's and Master's theses, primarily at the Faculty of Mechatronics, Informatics and Interdisciplinary Studies of the Technical University of Liberec. We will be pleased if it is also used by readers outside the faculty. The text contains specific information regarding Bachelor's and Master's theses, but it may also be used to create final reports of annual projects. The principles outlined herein are also valid for writing scientific and technical reports, and most of the recommendations given can be used when writing dissertations and habilitation theses, but in these cases, we recommend studying other literature.

The first chapter deals with the formal requirements of the work, such as the types of binding, the choice of paper for printing, the types and sizes of fonts, the division of the text into chapters, and their numbering. The second chapter provides an overview of the sections of the thesis, including their content. It also includes instructions on how to create a bibliography and how to include references to literature in the text. The third chapter describes the rules for the inclusion of illustrations, tables, formulas, and source codes in the text and the use of cross-references.

Appendixes [A](#) to [C.3](#) contain samples of mandatory parts of the thesis, such as the front page of the boards, the title page, the assignment and the author's declaration. Appendix [D](#) lists and explains the basic typographical rules for writing text on a computer. Appendix [E](#) briefly focuses on the formatting of the English text, and Appendix [F](#) provides guidelines for converting to PDF format.

All recommendations are based on Czech standards that prescribe the formal editing of scientific and technical reports, dissertations, and similar documents.

The guidelines are published in PDF format as freely available study material. The text will be continuously updated based on feedback, changes in rules, and legislation; however, we also recommend monitoring the current status of university and faculty directives.

We believe that these guidelines will aid you in writing documents and will contribute to the fact that the result of your efforts will be work that you will feel good about.

In Liberec 29 February 2024

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# 1 Formal Requirements of the Thesis

## 1.1 A Few Introductory Words

This document was created primarily as a guide for editing a Bachelor's or Master's thesis. The recommendations in the text are based mainly on standards ČSN 01 6910 [23], ČSN ISO 7144 [5], and ČSN ISO 690 [24], and the website of the Internet Language Guide of the Institute for the Czech Language of the Academy of Sciences of the Czech Republic [22], which sets the rules for writing documents of this kind. The standards referred to are available in the library of TUL [20].

The standards use the term *report* for works of this kind. The actual text of the thesis forms the *core* of the report and is usually supplemented by a *preface*, *lists*, and *appendices*. The text is divided into parts (chapters) of a maximum of three levels, which are referred to as *sections*, *subsections*, and *articles*. Each chapter begins with the heading of the respective level, which is distinguished by the size of the selected font and multi-level numbering (e.g., 1, 1.1, 1.1.1).

The following text also provides instructions on how to implement the relevant recommendations in a text editor environment. In our case, they were verified in the MS Word 2016 environment.

## 1.2 Binding

Requirements for binding may differ significantly between individual TUL faculties – some may require only an electronic version of the thesis, or the submission of one copy of the thesis for the needs of the expert reviewer and the State Final Examination committee. After the defence of the thesis, the author is returned the work, and it is no longer physically archived at TUL. Therefore, if a hard-cover is not required, it is possible to use detachable binding such as plastic ring binding, comb binding, zip binding, slide bars, and “snap” bars. These types of binding are also used for final reports of annual projects, etc.

Students may therefore request a hardcover for themselves as a nice souvenir of their studies, and it is still recommended for dissertations and habilitation theses (see the Rector's Directive [19]), and in such cases this type of binding should:

- provide strong durable support for the report's outer side and protection of the contents for the required period of time,
- prevent the report from being disassembled and reassembled,

- allow the report to be opened flat while not causing damage to the binding, such as on a scanner, photocopier, or desk,
- allow reports to be stacked on top of or next to each other.

These requirements are met in particular by traditional “book” binding using hard covers. As a not very good alternative, it is also possible to use thermal binding and metal ring binding, which are classified as binding that cannot be disassembled. Nevertheless, thermal binding has limited durability when frequently folded “flat”, not to mention the disputable strength of the support of the outside of the report when thin covers are used. Metal ring binding restricts stacking of reports, and their strength is also usually low.

### 1.3 Paper

The thesis should be printed on white opaque paper of a sufficient quality. The common specific mass paper of 80 g/m<sup>2</sup> meets the requirements. The thesis may be printed on one side of each sheet or on both sides. Final reports are usually printed on one side, but double-sided print is also acceptable<sup>1</sup>. According to the standard [5], the margins for A4 (210 mm × 297 mm) paper sheet format should be “sufficient”. The usual margins are 35 mm at the spine (be careful about the margin mirroring the double-sided print) and 25 mm at the top, bottom, and outer edge. The top margin of a page contains the *header* while the bottom margin contains the *footer*. The same paper should be used throughout the report. The “same” kind of paper from different manufacturers may have different surface properties, shades of white, etc., while such differences cause disruption in reading the report. It is therefore advisable to print the entire report on paper from the same ream. Different types of paper may be used in the Appendixes if necessary. Care must be taken if printing with different printers that may show differences in formatting or use different fonts, which may “break up” the layout. A suitable solution is to generate a PDF file and then print it out (see Appendix F).

### 1.4 Page Numbers

Pages are numbered with Arabic numerals in a successive sequence. The recto (the right-hand page in an open book) with double-sided print has to always have an odd number. The title page is number 1 and it is always a recto. Blank pages resulting from double-sided print are also numbered. If the report will be bound, it is a good idea to draw attention to the blank pages (mark them as 1 – blank page or add the text “this page is intentionally left blank” on such pages). The position of the page number is not prescribed. The page number is usually placed at the outer edge (in the footer) in the

---

<sup>1</sup>In the case of double-sided printing, the report must be prepared for this, for example, by the appropriate placement of page numbers.

case of double-sided print. For one-sided print, it is usually placed in the middle of the footer or on the outer edge. The page numbers are not included on some of the pages (title page, declaration, and thesis assignment), although they are included in the total number of pages. More details are included in Chapters 2.1.2 and 2.1.3.

A header does not have to be inserted in the thesis. If the header is inserted, it is usually a single line, and the name of the first level chapter is inserted into it. Inclusion of multi-line text or a logo in the header should be avoided.

## 1.5 Chapter Numbers

Chapters are numbered according to standard [5] for the core of the report (see Chapter 2.2.1 for the text of the report itself). Incremental numbering at no more than three levels using Arabic numerals is recommended. According to [5], the chapters of the front matter (assignment, declaration, acknowledgements, preface, abstract, table of contents, introduction) are not numbered. The conclusion usually has numbered pages. Appendixes have their own page “numbering” (such as Appendix A, Appendix B, ...), which is further reflected in the “numbering” of their subsections and usually also their figures, tables, and graphs (for example Graph A.1: Function curve).

## 1.6 Text Formatting

The main text (see Chapter 2.2) must always begin on the recto (the right-hand page of an open book) and a new section (i.e., a first level chapter) should begin on a new page.

### 1.6.1 Paragraphs

The standards do not prescribe in detail the alignment of text into paragraphs or the use of fonts. The text of the report is usually “justified” (on both sides). The first line of a paragraph at the beginning of a chapter, i.e., immediately after the title, is usually not indented. This corresponds to the settings of some text editors. Indentation is usually set between 1.0 and 1.5.

If a paragraph is justified, it is also advisable to set automatic hyphenation (*Page Setup / Hyphenation / Automatic*). It is not customary to divide words on the last lines of a page or column, in headings, or the last words in a paragraph. The overuse of hyphenation also has a negative aesthetic effect. In justified paragraphs, the number of consecutive lines with hyphenated words at their ends should not exceed three (*Page Setup / Hyphenation / Hyphenation Options, Limit consecutive hyphens to 2*) to prevent a visually unappealing ladder of identical symbols. If a paragraph is divided at the end of a page, there should be no dangling lines, also known as *widows*. A paragraph may only be di-

vided in such a way that at least two lines remain in each of its parts (*Paragraph, Text Flow tab, Widow/Orphan control*). The titles (headings) must not be split or separated with the end of page from the following text (*Paragraph, Text Flow tab, Keep with next*).

Another element that should be avoided are so-called *rivers*. Rivers are formed by vertical or oblique covering of spaces between words in three or more adjacent lines. The negative aesthetic effect of rivers increases with their length and with the width of the spaces involved. In this case, it is advised to reformulate the text.

When several columns are used (i.e., fewer characters per line) it is sometimes necessary to avoid hyphenation and align the text to the left. The same rule applies to the bibliography, where alignment to the left is usually set.

If you decide to justify the words when setting the alignment, then carefully check that there are no spaces between words larger than the width of the letter “m” in the lines of text. In this case, it is necessary to use hyphenation (most text editors can do this without any problems), reformulate the text, or change from justified to left-aligned text.

The size of spaces between paragraphs is not prescribed, approximately half the size of the basic font is used, or the visual separation of paragraphs may be ensured by indenting the first line. Each individual paragraph should contain complete information. It is not advisable for a paragraph to contain a single sentence, and a paragraph that is too long may also be confusing.

## 1.6.2 Fonts

For the text of the report, a uniform font should be used throughout the work. A so-called *antiquarian serif* (serif) font is recommended (for example, Times New Roman, Merriweather, Georgia, Latin Modern Roman, T<sub>E</sub>X Gyre Pagella), because serifs “guide” the eyes when reading longer continuous texts. A sans serif, so-called *grotesque* font (for example, Inter, Helvetica, Arial nebo T<sub>E</sub>X Gyre Heros) is used for short messages, cover descriptions, slogans, headings, or in presentations. A serif font with a font size between 10 and 12 points is used for continuous text.

To highlight certain parts of the text, either the cut or the shape of the font is used, i.e., thick (**Bold**) or cursive (*Italic*). All other forms of highlighting (including underlining, `s p a c i n g` – insertion of spaces between letters, etc.) are not recommended. Changing the font size of the so-called *degree* is used to highlight headings.

To highlight, for example, program code, a slightly different strategy is used by using a non-proportional so-called *typescript font*. Examples of such fonts are mentioned in Chapter 3.4.2.

Mathematical expressions are a frequently part of the text. In the case of mathematical typesetting that follows standards [25, 26], it is necessary to choose a font that supports special mathematical symbols, or the Greek alphabet. Such fonts include, for example, Latin Modern Roman, T<sub>E</sub>X Gyre Pagella Math, and others.

In the above examples of serif and sans-serif fonts, it can be seen that even though they are the same size, some of them appear larger or more prominent than others. For this reason, it is important to choose fonts from the same *font family* and, if that is not possible, fonts that balance each other. Examples of such a font family include Latin Modern or T<sub>E</sub>X Gyre, or, as in the case of the fonts recommended in the TUL Graphics Manual, a combination of complementary fonts such as Merriweather, Inter, and Noto Sans Mono.

The appropriate choice of fonts is much more complicated than it has been briefly presented here. For those who would like to learn more, to dive deeper into the secrets of typography, we can recommend the following books [1, 13, 15, 17].

During the revision of these guidelines, a different combination of fonts was chosen compared to the previous editions<sup>2</sup>. The sans-serif font Inter was chosen for the headings, and for the text part, taking into account examples of mathematical typesetting, the T<sub>E</sub>X Gyre Pagella serif or T<sub>E</sub>X Gyre Pagella Math font. For typesetting source codes and keyboard shortcuts, the non-proportional font Consolas<sup>3</sup> was chosen.

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<sup>2</sup>Previous editions were set for T<sub>E</sub>X with the typical Computer Modern font family.

<sup>3</sup>The TeX Gyre Cursor typeface is also in the T<sub>E</sub>X Gyre font family, but its base cut is too light.



## 2 Report Structure

At the beginning of each of the following articles, it is indicated in square brackets whether the corresponding part is numbered as a chapter, whether it is included in the total number of pages, i.e., whether the pages are numbered and, if so, whether the numbers are shown on the pages.

### 2.1 Front Matter

A thesis starts with the standard pages: title page, assignment, and declaration. They are covered in detail in the sections with the same name.

At this point, it is worth noting that in recent years, the practice of inserting front matter generated from IS STAG<sup>4</sup> has become established at TUL. This includes the title page, assignment, and declaration. These pages are merged with the rest of the text of the thesis in the form of a PDF by the author of the thesis (see Appendix F). This ensures that the thesis is not missing any important details contained on these pages.

#### 2.1.1 Front Board and its Pastedown (pages one and two of the cover)

*[chapter numbering NO, page numbering NO]*

The boards protect the report from damage and serve as the initial presentation of the report. They should be of a sufficiently informative as well as tidy character. The pastedown is usually left blank. A list of mandatory details for scientific and technical reports, and the arrangement of dissertations or similar documents is provided in ČSN ISO 7144 [5]. The front board of a Bachelor's or Master's thesis at TUL contains the following:

- Name of the university and faculty in accordance with the relevant valid Rector's directive,
- Title of the thesis,
- Type of thesis (Bachelor's, Master's, dissertation, habilitation, project, ...),
- Name of the author,
- Place and year of publication.

---

<sup>4</sup>My studies – Qualification work – Add information about the qualification work – Generate a university qualification work assignment in PDF format.



The choice of the author to somehow affect the appearance of the boards is limited, especially in the case of gravure printing. The appearance of the boards is also determined by the technical capabilities of the selected printer; however, the choice of fonts, font size, and placement of information on the front board should correspond as much as possible to the recommended model (see the relevant valid Rector's Directive, or Appendix A or B)).

### 2.1.2 Title Page

*[chapter numbering NO, page numbering YES (number 1), but this number is NOT shown]*

This page is the basic source of bibliographic information. For theses at TUL, the title page along with the assignment and declaration is downloaded directly from IS STAG in PDF format. The recommended layout of this page is also shown in Appendix C.1. This page should contain the following information:

- Name of the university and faculty,
- Type of thesis (Bachelor's, Master's),
- Name of the report in Czech (and in English if applicable),
- Study programme,
- Name(s) of the author(s),
- Name of the supervisor including his or her academic title(s),
- Name of the consultant, including his or her academic title(s), if applicable,
- Date and place of publication (submission for printing),
- Other graphic elements according to the example.

In the case of double-sided printing, the second side of the title page is left blank (see Chapter 1.4).

### 2.1.3 Thesis Assignment

*[chapter numbering NO, page numbering YES, but this number is NOT shown]*

The thesis assignment is downloaded in PDF format from IS STAG. An example of the generated pages of the assignment is given in Appendixes C.2 and C.3. If the thesis is printed, it shall contain the signed original of the assignment (signature of the Dean and the Head of the Institute/Department), the electronic version must not contain signatures. The thesis assignment is usually double-sided, in the case of one-sided printing it is counted as a single page (number 2), in the case of double-sided print each side of the assignment is counted (usually 3 and 4).

#### **2.1.4 Declaration**

*[chapter numbering NO, page numbering YES, but this number is NOT shown]*

The text of the declaration (see Appendix C.4) is prescribed and should not be changed. It is downloadable as part of the assignment in PDF format from IS STAG. It has sequence number 3 for single-sided printing, and numbers 5 and 6 for double-sided printing. The electronic version must not contain a handwritten signature.

#### **2.1.5 Acknowledgements**

*[chapter numbering NO, page numbering YES, but this number is NOT shown]*

This chapter is optional. Its wording is not prescribed. In this chapter, it is possible to thank anyone who contributed in any way to the solution, provided consultations, advice, equipment, or otherwise supported the author (family, grants, etc.). You can explain the reasons for writing the report, comments, or how it is related to other reports. If you chose to write the acknowledgements, you usually place it before the abstract in a Bachelor's or Master's thesis. If you write acknowledgements in another type of report (conference paper, technical report, etc.), then the chapter is included in the body, just before the bibliography, according to [3].

#### **2.1.6 Abstract**

*[chapter numbering NO, page numbering YES, but this number is NOT shown]*

According to ČSN ISO 214 [3], an abstract should be between 250 and 500 words long. It should be informative, understandable, and should cover the whole report. Keywords should be listed in a separate paragraph immediately after the abstract – usually five keywords are listed. According to the Rector's Directive [19]), the thesis title, abstract, and keywords are listed in Czech as well as in English in a Bachelor's or Master's thesis (this information is entered into IS STAG when the thesis is submitted). If the abstract is also written in another language, it should be placed below these two mandatory ones.

The abstract does not contain images or tables and should not be created by combining the introduction and conclusion of the thesis.

*A note on terminology:*

*Abstract* or *Statement* is a brief summary of the entire work. It summarizes the content of the text, specific objectives, methodology, comments on the results, and conclusions. The abstract is used so that the reader can decide after reading it, whether it is beneficial for him or her to read the entire thesis.

*Annotation* does not contain specific results, it only briefly describes the issues being addressed and what the conclusions stated in the thesis relate to.

*Résumé* contains a summary of the most important findings and conclusions reached by the author in his or her thesis. It outlines the issues being addressed and states the benefits for the related area being addressed.

## **2.1.7 Table of Contents**

*[chapter numbering NO, page numbering YES, this page number IS shown]*

In a Bachelor's or Master's thesis, the table of contents is placed immediately after the abstract, starting on a new recto and containing links to the location of all sections and subsections in the text of the report. If lists of figures, graphs, and tables are inserted (as a rule, if the number of relevant elements is greater than three), then they are placed after the table of contents.

## **2.1.8 List of Symbols, Abbreviations, and Terms**

*[chapter numbering NO, page numbering YES, this page number IS shown]*

Abbreviations and symbols should be explained whenever they are used for the first time in the text. If there are a large number of symbols and abbreviations, a list should be given for clarity immediately after the list of figures and tables (or after the table of contents). It should be remembered that there are standards that must be respected when using symbols (for example, ČSN EN ISO 80000-1 [25]).

## **2.2 Body of the Report**

### **2.2.1 Core of the Report**

*[chapter numbering YES, page numbering YES, this page number IS shown]*

The body of the report should be divided into sections, subsections, and articles (i.e., into chapters of no more than three levels). The different chapters should describe the project objectives, theory of the research, methodology used, solutions to the assigned issue, the results, and a discussion thereof. According to [4], each chapter is numbered with Arabic numerals (1, 1.2, 1.3, 1.3.1, etc.) while a dot is not put after the last digit. The report is intended for an adequately educated specialist; therefore, dealing with general knowledge of the field in too much detail is not advisable. Emphasis should be placed on your new results and a corresponding description thereof. Whenever possible, graphs, figures, tables, and other objects should be incorporated directly into the text as close as possible to where they are written about (see Chapter 3). If illustrations are extensive or of a special nature, place them as separate Appendixes.

Chapter one (usually the introduction) should specify the purpose and objectives of the thesis and roughly outline the methodology of the solution. The abstract should definitely not be repeated here, neither should the results be described. If a preface is not included, the introduction may deal with the themes that would otherwise be part of the preface (with the exception of the acknowledgements).

## **2.2.2 Conclusions and Recommendations**

*[chapter numbering OPTIONAL, page numbering YES, page number IS shown]*

This chapter should include an evaluation of the entire report, an assessment of the quality of the results, a comparison with other methods, a comparison with the objectives of the thesis and an assessment of their fulfillment. It should be remembered that even a negative result is a result if it is explained properly and if there is sufficient effort behind it. The text should not go into too much detail and passages from the body of the thesis should not be repeated here. It is also possible to list possible follow-up themes or possibilities for continuation.

## **2.2.3 Bibliography**

*[chapter numbering NO, page numbering YES, page number IS shown]*

The bibliography contains a list of all the sources that were used in solving the issue. Its formal regulation is dealt with by ČSN ISO 690 [24], which is required at TUL by the Rector's Directive [19]. The rules for its creation along with several illustrative examples are given in publications [27, 28].

According to the standard, the order of information in a bibliography is as follows:

1. Name(s) of the author(s), if available,
2. Title of the source,
3. Type of medium (as necessary),
4. Issue,
5. Name of the edition (if available),
6. Numbering within the described unit,
7. Details of the publisher (location, name of publisher),
8. Standardized identifier (if available),
9. Accessibility or location of the information,
10. Additional general information.

If the *Harvard* (author-date) system is used, then the year is inserted after the name of the creator (author). The standard does not stipulate the format of the individual elements of the bibliographic references and their separators. The standard only states that the system of punctuation and typography should be consistent throughout the bibliography and that each element of a bibliographic reference should be clearly separated from the following elements with punctuation marks.

The following examples use the recommended formatting and punctuation. There are three ways to write references:

- Bibliographic references are arranged alphabetically by the surname of the first author, the year of publication is inserted after the author's name, as used in the Harvard system.
- In the event that numbered references are used, bibliographic references should be arranged as a numbered list.
- When running notes are used, the bibliography is arranged alphabetically by the first element, which is usually the author's surname.

#### **2.2.4 References in the Text**

The specific form of the references must be agreed upon with the supervisor in advance and the references must be uniform throughout the document. It is possible to choose one of the following methods (see also ČSN ISO 690 [24]):

- The Harvard (author-date) system,
- Numeric citations,
- Running notes.

The first method provides the reference without having to consult the list, but it takes more space within the body of the report and may be more difficult to handle cross references in some text editors. If the name occurs in the text as its part, then only the year is shown within round brackets, and possibly the page number. If not, both the name and the year, and possibly the page number, are shown within round brackets.

The second method is often used. However, it feels anonymous, and the page numbering may become shifted when making changes to the text if due attention is not paid, which results in losing the shared information. That is why using cross references is advisable. A reference in the text may be inserted as a number within round or square brackets or as a superscript. For clarity, putting numbers in square brackets is recommended.

With the third method, the reference to the source is in the form of a number within round or square brackets or as a superscript. Superscript is mostly used for running notes. If it is the first occurrence, the footnote shows the full bibliographic reference. A shortened form may be used when repeatedly referring to the same source.

The examples show all three methods of inserting references to the literature used with the body of the report.

### The first method of referencing using author name abbreviations

... it was said [Kovář 2001, p. 34] that...

Dr. Kovář (2001a, p. 18) states that...

The relevant bibliography then states the following:

JÍRA, Petr, 2022. *How to keep sane when writing a thesis*. Bachelor's Thesis. Liberec: Technical University of Liberec. Faculty of Mechatronics, Informatics and Interdisciplinary Studies. Thesis supervisor Josef Neznámý.

KOVÁŘ, Josef, 2001a. Kterak kovat. *Journal Ocelář*, Vol. 5, No. 8, pp. 34–36. ISSN 1234-5678.

KOVÁŘ, Josef, 2001b. *Zásady kování*. 2nd edition. Chapter 3, pp. 12–20. České Budějovice: KOPP. ISBN 80-12345-67-8.

### The second method of referencing using numbers

... as stated in [1], it is true that...

... Kovář [3, p. 34] stated that...

The bibliography then states the following:

[1] JÍRA, Petr. *How to keep sane when writing a thesis*. Bachelor's Thesis. Liberec: Technical University of Liberec. Faculty of Mechatronics, Informatics and Interdisciplinary Studies, 2022. Thesis supervisor Josef Neznámý

[2] KOVÁŘ, Josef. Kterak kovat. *Journal Ocelář*, August 2001. Vol. 5, No. 8, pp. 34–36. ISSN 1234-5678.

[3] KOVÁŘ, Josef. *Zásady kování*. 2nd edition. Chapter 3, pp. 12–20. České Budějovice: KOPP, 2001. ISBN 80-12345-67-8.

### The third method of referencing using numbers running notes

P. Jíra<sup>5</sup> bases his work on the results of J. Kovář<sup>6</sup>...

Running notes only contain the reference sources on the page used. The bibliography at the end of the report contains a complete list formatted by the second method of referencing.

---

<sup>5</sup>JÍRA, Petr. *How to keep sane when writing a thesis*. Bachelor's Thesis. Liberec: Technical University of Liberec. Faculty of Mechatronics, Informatics and Interdisciplinary Studies, 2022. Thesis supervisor Josef Neznámý

<sup>6</sup>KOVÁŘ, Josef. Kterak kovat. *Journal Ocelář*, August 2001. Vol. 5, No. 8, pp. 34–36. ISSN 1234-5678

The abbreviation p. is used for page in texts written in English. The author's surname is usually written in capital letters and is separated from the first name by a comma. Any other co-authors are written according to the standard in reverse order (first name and then surname). Instead of the name, it is possible to write only the initial of the name. The title of the cited publication is usually italicized. If the document is part of an anthology, journal, etc., then the name of the anthology, journal, website etc. is written in italics, and this name is preceded by the preposition "In:". The date of the citation is inserted in square brackets [cit. 2022-12-24]<sup>7</sup> and information that is not known and is only estimated [circa 2007]. Punctuation between individual parts of the information is not prescribed by the standard. Authors' names are usually separated by a semicolon. The title of the work is separated from the authors' names by a dot.

For effective work with citation records, there are so-called *citation managers* for their generation and management. MS Word and Open/Libre Office provide built-in tools for managing citations. Generating and managing records is offered by a citation manager in the form of the Czech online project [www.citace.com](http://www.citace.com)<sup>8</sup>. This is supported in the catalogues of most Czech libraries. Liberec libraries [knihovna.tul.cz](http://knihovna.tul.cz) and [www.kvkli.cz](http://www.kvkli.cz) are no exception. Citation records may also be generated using, e.g., [www.nkp.cz](http://www.nkp.cz), [scholar.google.com](http://scholar.google.com), [www.webofscience.com](http://www.webofscience.com), [www.scopus.com](http://www.scopus.com), and others. To manage citation records (generation of citations not only in accordance with ČSN ISO 690, but also in other citation styles) it is possible to use applications in the form of citation managers [www.zotero.org](http://www.zotero.org), [www.jabref.org](http://www.jabref.org), [www.mendeley.com](http://www.mendeley.com), [endnote.com](http://endnote.com) and others that allow offline or online work.

If you are going to use a citation generator in your work, use one tool consistently to maintain a consistent look and format of the citation records presented.

The citation method given in ČSN ISO 690 is not prescribed by any guidelines at TUL (nor at FM), but the requirements of the specific faculty must be followed. The second method of referencing (number references in square brackets) is used in these guidelines, and the bibliography is written alphabetically.

## 2.3 Appendixes and Final Parts

### 2.3.1 Text Appendixes

[chapter numbering NO, page numbering YES, page number IS shown]

This section includes all the individual Appendixes to the thesis (additional illustrations, tables, ...) as well as other materials that are necessary for the completeness of the report but could not be included in the core of the report for any of the following reasons:

---

<sup>7</sup>The abbreviation "cit." means cited.

<sup>8</sup>Members of the TUL academic community have free access to the PRO version.



- It would be difficult to place them in the body of the report.
- They would distract attention from or disrupt the logic in the core of the report.
- They are too large.
- They have a different method of copying.
- They are not necessary to understand the report, they only provide additional information.

The reason for placing figures, tables, and graphs in Appendixes is usually their size and their different appearance or different colours created by different printers. A description of the equipment used, which is not in direct relation to the solution of the thesis, a description of additional methods, or listings and comments of computer programs used or produced, may be included in the Appendixes. A bibliography unrelated to the core of the report but related to a particular Appendix may also be part of this section. In such a case, relation to the Appendix concerned is included in such a reference (for example [B.3]).

According to ČSN ISO 7144 [5], the numbering of pages in Appendixes should be the same as the numbering of pages in the body of the report, and each Appendix or level one chapter has to begin on a new page.

### **2.3.2 Back Board and Pastedown**

The back board (page four of the cover) is usually left blank. The technical details, imprint may be placed here. The back pastedown (page three of the cover) is also usually left blank.

### **2.3.3 Spine**

If technically possible, and if the spine is wide enough, the following details may be placed on the spine: the initial of the author's name and surname, and the name of the report (abbreviated if necessary). The lower 30 mm of the spine is left blank for library purposes.

## **2.4 General Comments on the Final Editing of Documents**

### **2.4.1 Typographic Principles**

Of course, not only the rules of the specified standards apply to writing the thesis (text typesetting), but also the rules of the language used. Some fundamental rules have



been included in Appendix D. Be careful of the autocorrect feature of “advanced” text editors – they are not well trained for professional text and, especially when Czech and English words are mixed, they can sometimes do more harm than good. Other intricacies of writing text are also commented on in Appendix D.

#### **2.4.2 Examples of Front Matter Pages**

The appearance of the mandatory front matter pages is dealt with in current legislative instructions of TUL, and examples are shown in Appendixes C.1 to C.4, herein.

#### **2.4.3 Generation of PDF Files**

According to the valid Rector’s Directive, the PDF format is the prescribed format for submitting qualification work. A detailed description of the PDF file format, and options for generating, splitting, and merging are included in Appendix F.

#### **2.4.4 Text Editors, Word Processors, Desktop Publishing**

Several terms are used in relation to text preparation tools (and not always entirely correctly). What is the difference between *text editor*, *word processor*, and *desktop publishing*? Which tool is best for your work? We will try to answer these questions in the following paragraphs.

##### **Text Editors**

According to established terminology, a text editor is a software tool used primarily for creating and editing plain text (its content pages), without significant formatting capabilities (limited choice of fonts and typefaces, few options for wrapping text into paragraphs, only simple page formatting, no additional objects such as pictures and graphs etc. can be inserted). Some text editors support the syntax of writing specific text (e.g., they use colour to distinguish keywords in a programming language) using autocomplete. Hence, they help with the contents of the document and so are mainly used to support programming activities. Such tools are not entirely suitable for writing final academic theses. Examples of text editors are Notepad or WordPad (included in MS Windows), as well as “programming” editors such as PSpad, Notepad+, ConTEXT, TextMod, and many others.

##### **Word Processors**

An application is considered a word processor when it can prepare (format) the pages of the document in the way we want the document to look when it is printed (a feature known as WYSIWYG: What You See Is What You Get). The application has to be able to process the text and insert objects into the desired print form on

the screen, hence the name word processors. Word processors most often used for the routine preparation of documents. The most well-known and widespread word processor is MS Word, but it is certainly not the only one. To write academic papers that do not require any sophisticated compatibility apart from exporting to PDF, there are free applications, such as Writer from the LibreOffice, or OpenOffice packages, Google Docs, LifeScript (part of MATLAB), and others. LyX, which is built on the  $\text{\LaTeX}$  typography system, is another free word processor. However, the document is created in a different way than in the previously mentioned word processors, i.e., using the WYSIWYM (What You See Is What You Mean) approach, where more emphasis is placed on the structure of the document than on its appearance.

### Desktop Publishing

Desktop publishing (DTP) applications are tools for the highest level of text document processing. DTP applications can handle the most demanding design and artistic requirements of authors and are equipped with tools for professional print preparation. These applications can also be used when writing a thesis. Free tools include the already mentioned  $\text{\TeX}$  ( $\text{\LaTeX}$ ), Scribus, Inkscape, and others. Commercially available tools include Adobe InDesign, QuarkXpres, Microsoft Publisher, or tools from the Corel package.

Selection of the text editing application can also depend on other criteria. The main ones are usually the price and file format compatibility, i.e., what type of data files the application creates and how portable they are to other applications. Good options for teamwork on the same document include Google Docs or Microsoft 365 (formerly Office 365), as well as built-in office tools in applications such as Microsoft Teams. It is also possible to use online applications (e.g., Overleaf [2]) or other applications that do not need to be installed.

For the sake of simplification, the term “text editor” may be used to refer to any type of application for working with text.

## 3 Object Insertion Rules

Illustrations (pictures, graphs, images) and tables are inserted in the text as close as possible to where they are first mentioned. If inclusion in the text would be distracting, illustrations and tables are given in separate Appendixes (see Chapter 2.3.1). Illustrations should be simple, understandable, and the option of making black-and-white copies (without reducing readability) should be kept in mind. Attention should also be paid to the readability of illustrations, i.e., use an appropriate resolution.

The preparation of high-quality illustrations is an issue beyond the scope of these guidelines. We can refer the reader to other literature, for example [1, 13, 15]. In any case, the author should know the terms: *vector* or *raster* graphics, *DPI* resolution, or *CMYK*, *RGB* colour models. Choosing a suitable graphic format of the illustration significantly affects the quality of the entire thesis. While writing, it is advisable to test print some of the pages with illustrations, as they may look different on the screen from what they do on paper.

If an illustration or a table is taken from another source, then the issue of copyright must be taken into consideration (state the author and the source, i.e., properly cite). The citation should be given in the caption and the source should appear in the bibliography (See Chapter 2.2.3).

### 3.1 Illustrations

Below each individual illustration, there should be a caption, which contains an identifier (category/label/prefix), sequential number, and description. The identifier is selected according to the type of illustration, e.g., Figure, Graph, etc. All illustrations should be numbered with a continuous sequence throughout the report or in each section. In the first case, illustrations are numbered with a single number, in the second with a two-number *section.order*. With a larger number of images, numbering using double numbers in each section is preferred. The description should be brief and describe the content of the relevant illustration. The caption is important for the automatic generation of the list of illustrations, which should provide information about where the corresponding illustration is located and what it contains.

There is no prescribed punctuation between the sequential number of the illustration and the description, usually a colon is used, but a dot or dash can also be used. Captions may then appear as follows: *Figure 4.3: Description of the image*, *Fig. 112. Description of the figure*, *Graph 5.1 – Description of the graph*. The same punctuation is used for all captions throughout the thesis.

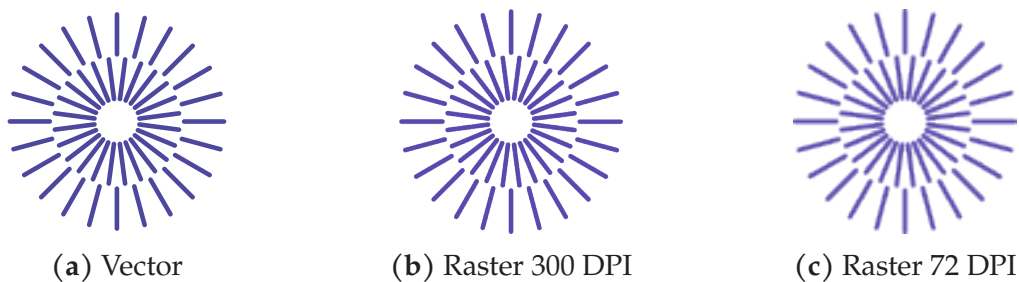
### 3.1.1 Figures

Figures 1 and 2 show the logo and additional symbols of the Technical University of Liberec in various graphic formats. Figure 1a and 2a show them in vector format, while in Figure 1b, 1c, 2b and 2c they are in raster format with different resolutions (300 and 72 DPI, respectively).

Blurring of the edges of the raster images is noticeable at a lower resolution. If possible, a higher resolution is recommended so that this occurs to a minimum. Alternatively, a vector format should be used, especially when there is text in the image that should be legible.



**Figure 1:** The logo of the Technical University of Liberec in three graphic formats (Czech version)

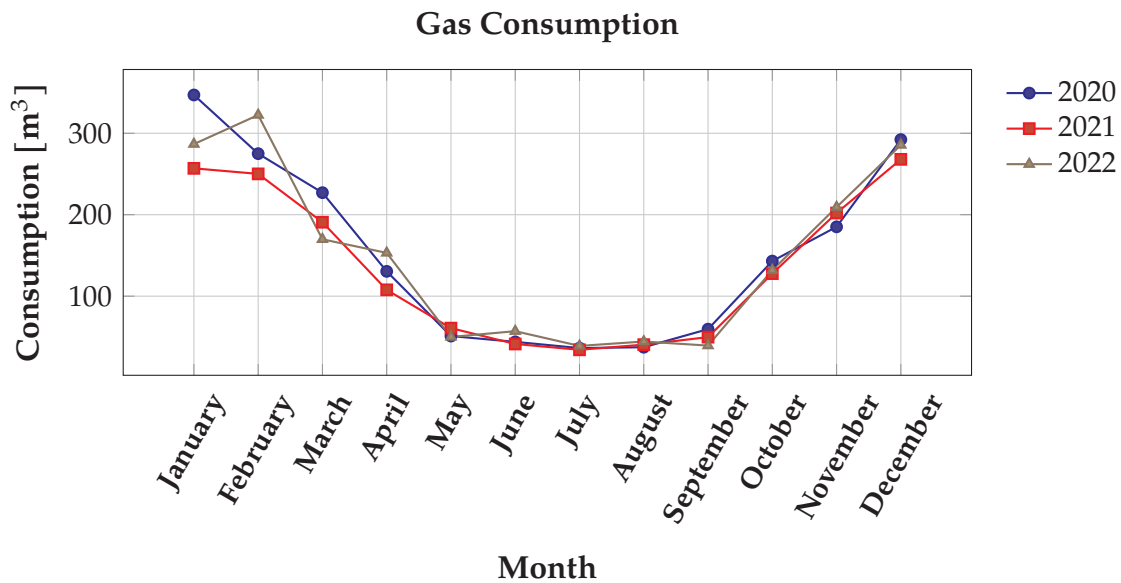


**Figure 2:** Additional symbol of the Technical University of Liberec in three graphic formats

### 3.1.2 Graphs

Graphs should be clear, comprehensible, and have the required informative value. Colour printing may be used, and several curves may be displayed in a single image. Graphs should include a title and a description of the axes (quantities, units). In the event that multiple curves are shown in one graph, then a corresponding legend should be included.

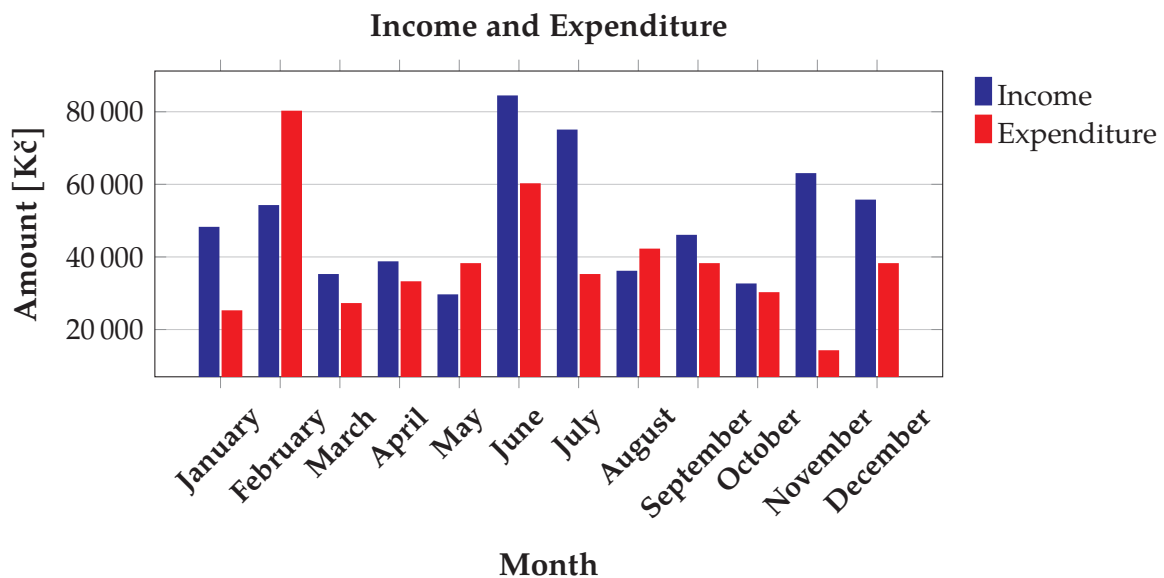
Graph 1 clearly and comprehensibly shows gas consumption in individual months (the data are from Table 1 in Chapter 3.2). It contains a title, a corresponding description of the axes, and a legend. It is an example of how a confusing table of data can be represented by a clear graph.



**Graph 1:** Example of a line chart

There are several rules and recommendations for choosing a suitable type of graph, and it is not the purpose of the guidelines to describe them all (for more information see, e.g., [12, 18]). Therefore, only the main features are given here, and it is up to each reader to supplement this information with further justification.

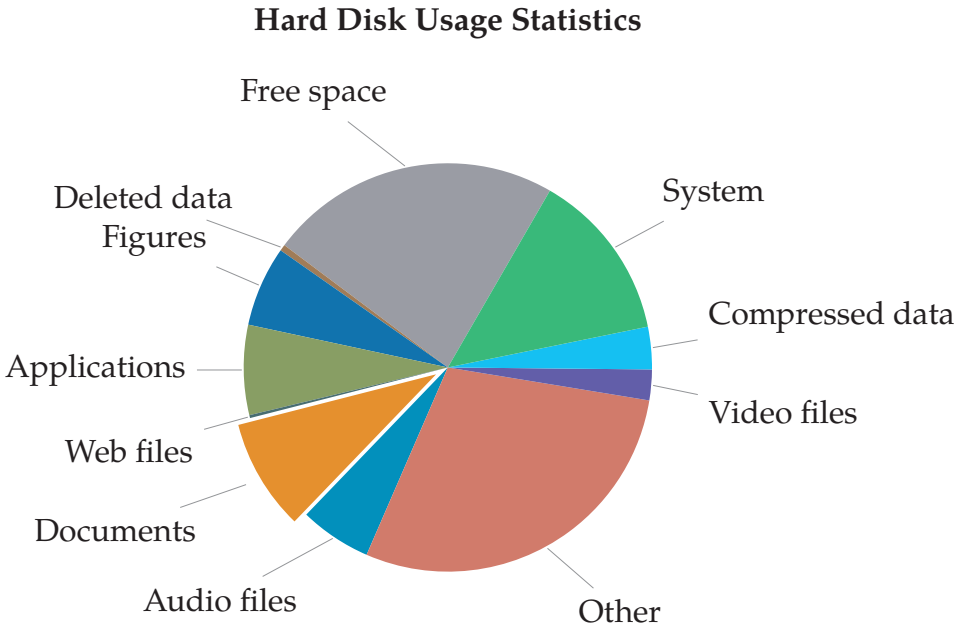
If several options are considered, the clarity and the degree of information conveyed by the graph are particularly important. A *bar chart* (e.g., election results) or a *clustered column chart* (e.g., Graph 2) is suitable for comparing values in one or more rows.



**Graph 2:** Example of a bar chart

A *stacked bar chart* is used when a ratio of individual items to the total value while comparing the share of each individual value with the total value in different categories needs to be displayed. An alternative is a *100% stacked bar chart*, where the distribution of the total value is shown on the individual columns.

In the event that a trend or a difference in the course of values over a period of time needs to be emphasised, then it is advisable to use a *line graph* (see Graph 1). *Pie charts* (see Graph 3) are suitable if the data show the distribution of the total value, there are not many different data categories, and they are not too different from each other. For all types of graphs, it is possible to add numerical values in addition to visual information, if necessary.



Graph 3: Example of pie chart

**3.1.3 State Diagrams and Flowcharts**

Visualisation of the problem helps greatly when solving a project. State diagrams (Figure 3) as well as Flowcharts (Figure 4) are often used in programming.

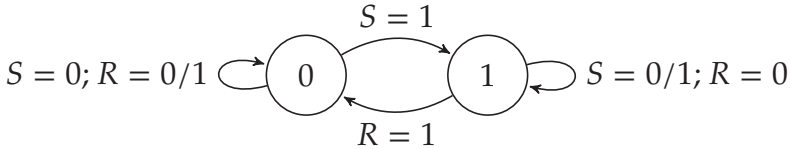
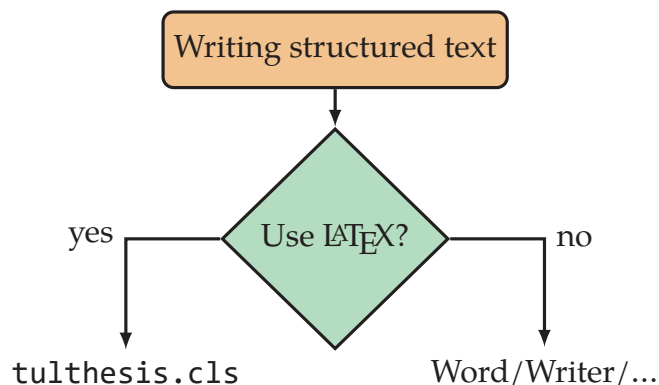


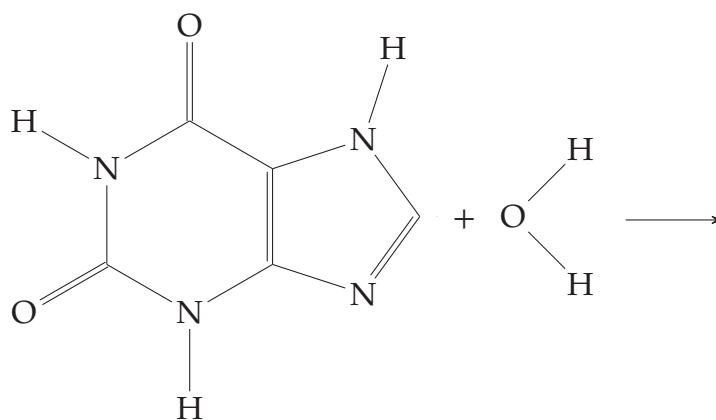
Figure 3: Example of a state diagram (RS flip-flop)



**Figure 4:** Example of a flowchart (deciding which system to use to write structured text)

### 3.1.4 Molecules and Chemical Compounds

Graphical objects may contain a description of chemical compounds, as in the example of a popular molecule in Figure 5. In this case, it can be a graphical representation of a chemical reaction / equation. It is important to decide how this object should be labelled, either as in Figure 5 or as an equation (6). Whichever option the author chooses, it is advisable to use it throughout the document.



**Figure 5:** Caffeine and water molecule

### 3.1.5 Diagrams and Drawings

Diagrams (block diagrams, circuit diagrams, etc.) and drawings are special graphic objects that are regularly found in technical works. In general, they can be in either 2D or 3D form, or in the form of assemblies generated using various CAD systems. While creating these objects, it is good practice to follow established professional standards. It is also important to realise that although it is mainly a graphic element, it often contains information in text form. Ensuring the readability and comprehensibility of the information presented in this way is a challenging task to which due attention must be paid.

## 3.2 Tables

Unlike illustrations, tables usually have headings at the top (see ČSN 01 6910 [23]). The heading comprises an identifier (category/label/prefix), sequential number, and description. As a label, Table or Tab. is usually used. Numbering and descriptions follow the same rules as for illustrations (see Chapter 3.1).

**Table 1:** Data for a line graph

Month	Gas consumption [m <sup>3</sup> ]		
	2020	2021	2022
January	347.00	256.93	286.69
February	274.95	250.13	322.40
March	227.05	190.78	169.83
April	130.44	107.76	153.12
May	51.00	60.76	49.94
June	43.89	41.27	57.00
July	36.26	34.14	38.92
August	37.30	40.47	44.30
September	59.50	49.70	39.32
October	143.07	127.71	131.87
November	185.11	202.06	209.29
December	292.25	267.98	285.56

## 3.3 Formulas

Simple formulas are usually placed directly into the text. Longer or more complex formulas that we want to refer to are shown on separate lines. Formulas, like other floating objects, are centred or aligned to the left with a small indentation. They have a reference number to the right of them.

$$E = mc^2 \quad (1)$$

Formulas (equations) are numbered sequentially throughout the thesis or within each section.

$$u(t) = \frac{1}{C} \int i(t) dt + u_0 \quad (3.2)$$

$$U_0 = -R_2 \sum_{i=1}^n \frac{U_{1i}}{R_{1i}} \quad (\text{Equation 3})$$



In the first example, the formula is numbered with a sequential number (1). In the second example, it has a chapter number and the sequential number in the chapter (section.order), i.e., (3.2). The third example contains a title (Equation Equation 3), in addition to the sequential number, in order to distinguish the sequential number of the equation (formula) in the text more clearly from, for example, references to the literature (the equation identifier may be supplemented with a prefix e.g., Formula, Equation, ...). *However, a uniform style of equation numbering should be followed throughout the thesis.*

$$a_2 \frac{d^2 y(t)}{dt^2} + a_1 \frac{dy(t)}{dt} + a_0 y(t) = e^{-t} 2 \cos(t) \sin(t) \eta(t) \quad (4)$$

Names of variables are shown in italics, both in formulas and in text. However, operators or functions are not italicised, as shown in e.g., equation (4). Formula notation is governed by the typographic rules for mathematical expressions. Numbers within formulas are written according to the corresponding standards (ČSN ISO 80000-1 [25]), i.e., with a decimal point and without commas as a separator for groups of (three) digits (12 345.678 901; 0.123). Care should be taken in using certain letters and numbers, for example I (capital letter i), l (small letter L), and 1 (one) can often be confused with each other; or o (small letter O), O (capital letter o), 0 (zero).

$$O \neq 0 \quad (5)$$

It is possible to write and refer to chemical expressions (reaction diagrams / chemical equations), similar to mathematical expressions:



### 3.4 Inserting Source Codes

In their thesis, many authors are faced with the question of how to insert and describe the source code of their application, which is often a key part of their thesis.

First of all, it is necessary to establish what form the source code takes, and then choose a suitable procedure for inserting it accordingly.

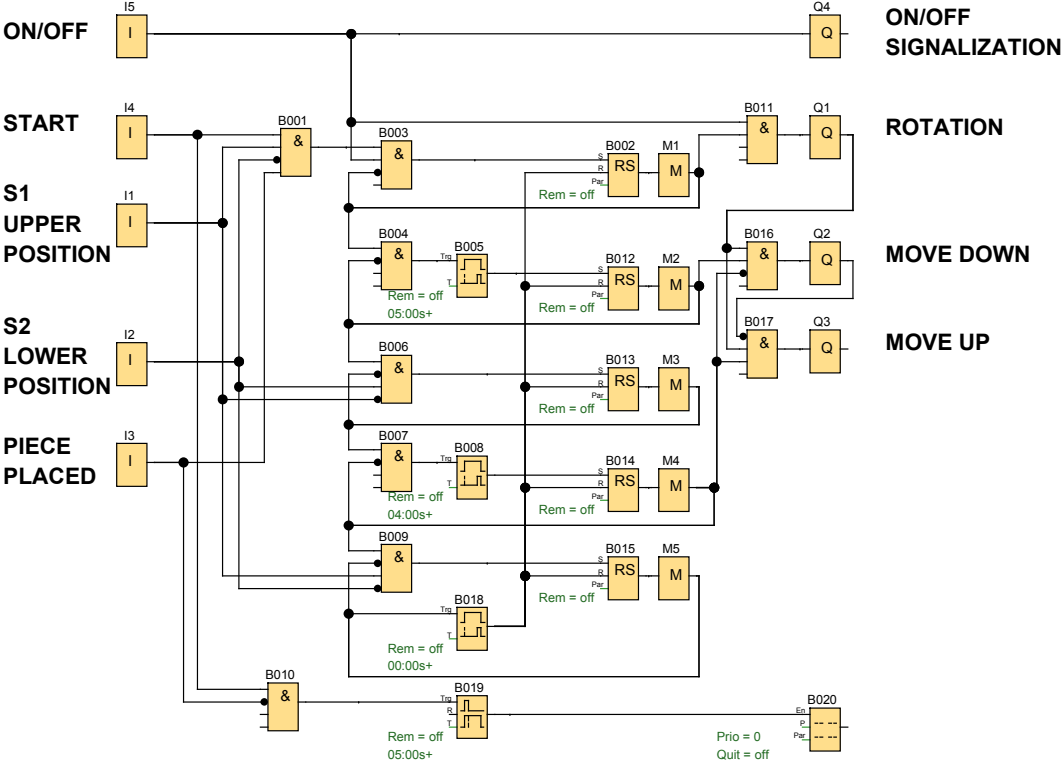
In principle, source code can take one of the following two forms:

- Image (FBD, LD, Simulink, Scratch, LabView, etc.),
- Text (HTML, C, Pascal, VHDL, Markdown, MATLAB, Python, etc.).

#### 3.4.1 Source Codes in the Form of an Image

The first group of source codes may be inserted as an object, i.e., image in raster or vector form. An example can be Source code 1 – Example of source code in Functional Block

Diagram (FBD) graphical programming language. Many development environments can export code to PDF, JPG, or other formats. If this feature is not available, a raster image (source code) may be obtained by taking a screenshot of the image (or part(s) thereof, see Clipping tools) or the active window using the Prt Scr or Alt + Prt Scr key, respectively. The issue of inserting illustrations (images) is covered in Chapter 3.1.



**Source code 1:** Example of source code in Functional Block Diagram (FBD) graphical programming language

### 3.4.2 Source Codes in the Form of Text

The second group of source codes should be inserted in the form of text, not as a screenshot. There are several reasons for this:

- If text needs modifying, it can be edited directly in the text editor (no need to take new screenshots).
- The text or its parts can be easily copied.
- A raster figure increases the size of the resulting document, and if the resolution is chosen incorrectly, it may be “blurred” or even illegible.

Text source code should be set apart from any surrounding text. That is why a fixed pitch, fixed width (typescript) font is used to insert text source codes. Development environment editors use fonts such as `Consolas`, `Courier New`, `Monospaced` and others. Whilst writing in  $\text{\LaTeX}$ , the Latin Modern font family is usually set, which also includes the fixed pitch, fixed width `Latin Modern Mono` font.

Source Code 2 is an example of using a typescript font with programming language syntax (in this case, `MATLAB`) highlighted. In addition, the source code is surrounded by a frame and provided with line numbers.

Most development environments allow the program source code, including the highlighted syntax, to be exported e.g., to an `RTF` file format that can be easily edited in `MS Word` or `Writer`.

Of course, there are other options available to  $\text{\LaTeX}$  users. They can use the command `verb`, environment `verbatim`, or environment `listings` with many available settings. More details on this issue may be found in the user manuals for the mentioned environments or other literature, such as [17].

In conclusion, it is worth mentioning a few techniques for inserting image or text objects. Authors may insert these objects with a title, for example “Source Code” (as in these guidelines) or “Example of Code” or use captions for image objects, “Image”, throughout the document, and provide a description of each image in the caption. In any case, it is advisable to only select one method and use it throughout the document.

```
1  close all
2  clear all
3  ...
4  uprFontSize = 18; % font size in plot
5  plot(t,yNamer,t,ySimul,t,ySimulShift,'LineWidth',2); % ←
   plot of three curves
6  legend('y_{namer}','y_{simul}','y_{simulPosun}') % legend←
   for each curve
7  set(findobj('Type','axes'),'FontSize',uprFontSize) % font←
   size setting
8  grid on
9  title('Transient Characteristics','fontsize',uprFontSize)←
   % graph title
10 xlabel('t [s]','fontsize',uprFontSize) % description of ←
   the x-axis
11 ylabel('y','fontsize',uprFontSize) % Description of the y←
   -axis
```

**Source code 2:** Example of source code in Matlab programming language

### 3.5 Cross References

Cross references are links to figures, tables, chapters, sections, the bibliography, etc. They are used to maintain a link between the referenced number and the given object. In the text, they are usually preceded by the word “see” as an imperative (e.g., see Table 2, [22]).

*Examples of Correct Use:*

- ... as mentioned in Chapter 3.2...
- ... as mentioned in the book by Jíra [1]...
- ... Albert Einstein (see Figure 4) was born at that time...
- ... examination results are shown in Table 3...

In text editors, cross references are inserted using *Insert* → *Cross Reference*. Next, the required type of link is selected and what the link should be inserted into (the entire caption, only the label and number, page number, etc.). In MS Word, however, it is not possible to insert only the number of the figure (tables, etc.)<sup>9</sup>, but the number including the label is inserted, so that a capital letter appears after the word see in the sentence (see Figure 1)<sup>10</sup>. The size of the initial letter can be adjusted in MS Word: after clicking on the link with the right button, the *Edit field* option is selected and then the *Small format* is selected.

---

<sup>9</sup> A numeric link may be inserted by LO Writer or L<sup>A</sup>T<sub>E</sub>X.

<sup>10</sup> In some word processors, a lowercase letter can be set.

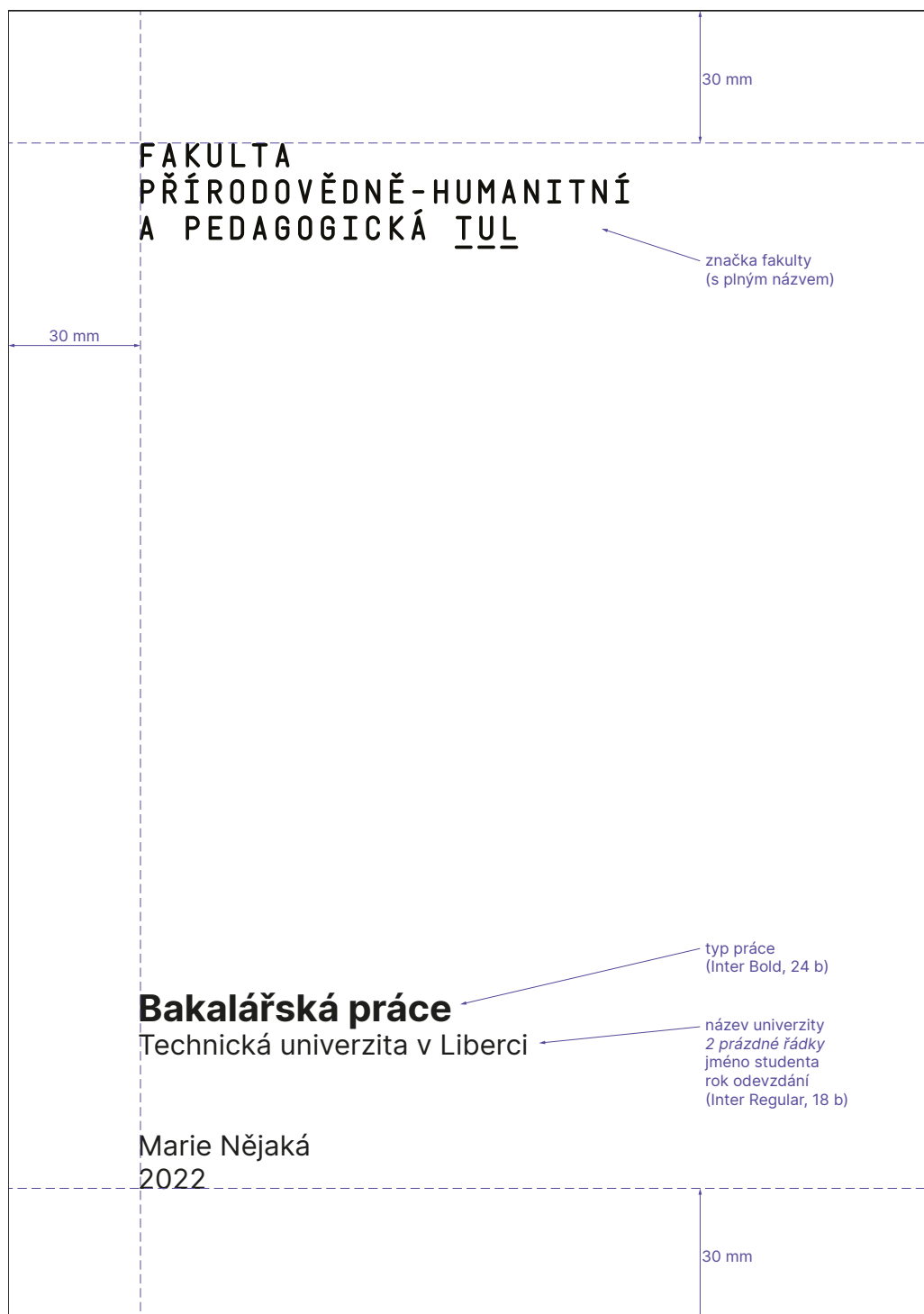
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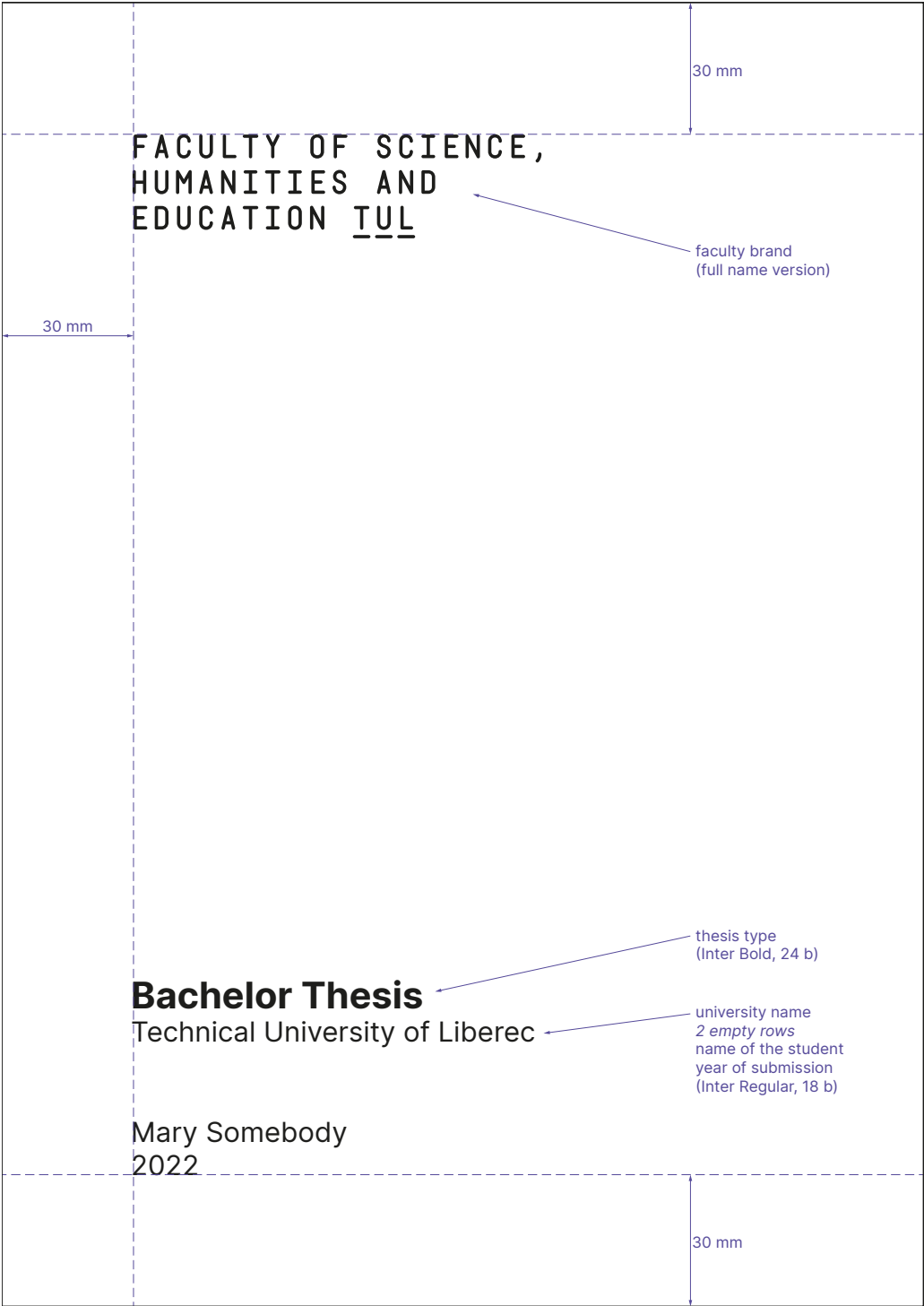
## A Appearance of the Front Board of the Final Thesis in Czech



Note: Source [19, page 6]



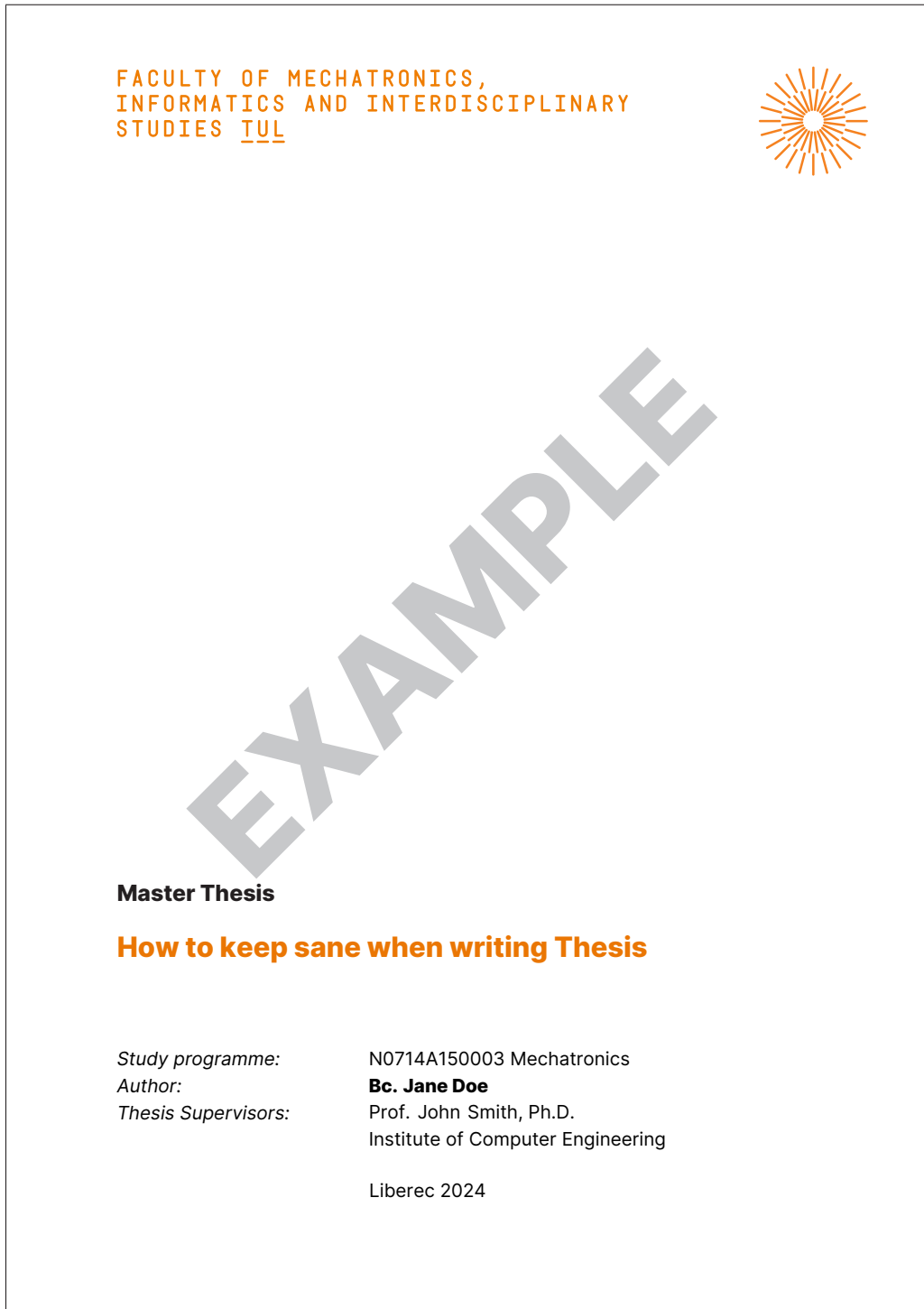
# B Appearance of the Front Board of the Final Thesis in English



Note: Source [19, page 7]

## C Title Pages of the Thesis Generated from IS STAG

### C.1 Title Page of the Thesis (Example)



## C.2 Thesis Assignment – Points of the Assignment (Example)

FACULTY OF MECHATRONICS,  
INFORMATICS AND INTERDISCIPLINARY  
STUDIES TUL



### Master Thesis Assignment Form

#### How to keep sane when writing Thesis

*Name and surname:* **Bc. Jane Doe**  
*Identification number:* M24001234  
*Study programme:* N0714A1503 Informatics  
*Assigning department:* Institute of Computer Engineering  
*Academic year:* 2023-2024

#### Rules for Elaboration:

1. Do a literature search on existing tools for correcting typographical errors and evaluate their usefulness in writing a bachelor thesis.
2. Based on the results, determine the criteria for the development of a tool for error correction.
3. Test the developed tool and modify the tool based on the feedback.
4. Describe the problems you encountered during the creation process.

### C.3 Thesis Assignment – Details and Bibliography (Example)

*Scope of Graphic Work:* as needed by documentation  
*Scope of Report:* 40-50 pages  
*Thesis Form:* printed/electronic  
*Thesis Language:* english

#### **List of Specialised Literature:**

- [1] ČSN 01 6910. Úprava dokumentů zpracovaných textovými procesory. Praha: Úřadem pro technickou normalizaci, metrologii a státní zkušebnictví, 2014.
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*Thesis Supervisors:* Prof. John Smith  
Institute of Computer Engineering

*Date of Thesis Assignment:* September 26, 2023

*Date of Thesis Submission:* May 14, 2024

prof. Ing. George DEKANUS, Ph.D.  
Dean

L.S.

doc. Dr. Ing. John Brown  
study programme guarantor

Liberec September 26, 2023

## **C.4 Bachelor Thesis Declaration**

### **Declaration**

I hereby certify that I have been informed that Act 121/2000, the Copyright Act of the Czech Republic, namely Section 60, Schoolwork, applies to my bachelor thesis in full scope. I acknowledge that the Technical University of Liberec (TUL) does not infringe my copyrights by using my bachelor thesis for TUL's internal purposes.

I am aware of my obligation to inform TUL on having used or licensed to use my bachelor thesis in which event TUL may require compensation of costs incurred in creating the work at up to their actual amount.

I have written my bachelor thesis myself using literature listed therein and consulting it with my supervisor and my tutor.

I hereby also declare that the hard copy of my bachelor thesis is identical with its electronic form as saved at the IS STAG portal.

Date:

Signature:

## **C.5 Master Thesis Declaration**

### **Declaration**

I hereby certify that I have been informed that Act 121/2000, the Copyright Act of the Czech Republic, namely Section 60, Schoolwork, applies to my master thesis in full scope. I acknowledge that the Technical University of Liberec (TUL) does not infringe my copyrights by using my master thesis for TUL's internal purposes.

I am aware of my obligation to inform TUL on having used or licensed to use my master thesis in which event TUL may require compensation of costs incurred in creating the work at up to their actual amount.

I have written my master thesis myself using literature listed therein and consulting it with my supervisor and my tutor.

I hereby also declare that the hard copy of my master thesis is identical with its electronic form as saved at the IS STAG portal.

Date:

Signature:

## D Text Formatting Principles

This appendix deals with certain text formatting principles; it is a translation of Czech version with respect to conventions used in English.

Some of the characters concerned are not available on the keyboard. However, they may be written using a character map (*Insert /Symbol*) – tabs *Symbols* and *Special Characters*. That is where punctuation symbols may be found. Another method of entering such characters is using keyboard shortcuts, usually by pressing the ALT key simultaneously with a number typed in on the numeric keypad (for a summary, see Table 2) or by switching the keyboard layout and character set.

### Punctuation Marks [.,;:?!]

Punctuation marks are written (typed) without a space separating them from the preceding word but are separated by a single space before the following text. A full stop is not normally used at the end of the captions of images, tables, or headings, and it does not need to be written after an element that is sufficiently separated from the surrounding text by graphic editing (e.g., bullet points, if there are no sentences in the bullet holes or if the bullet holes are not part of the sentence). A space is inserted after punctuation marks (full stop, comma, semicolon, colon, question mark, exclamation mark, interrobang<sup>11</sup>), but not before them! If several punctuation marks are used together, then they are written without spaces between each other.

*Example of Correct Use:*

Basic Murphy's Law: If anything can go wrong, it will.

*Example of incorrect Use:*

Murphy's Law Extension : When something goes wrong, everything goes wrong .

(Explanation: There should be no space before the colon or the full stop, and there should be a space after the comma.)

### Colon [:] – Exceptions

The colon may be positioned in various different ways. Either together with the surrounding text or with a non-breaking space before and one after it, depending on the context in which the colon is used. If the colon means “divided by”, it is used with non-breaking spaces before and after it:  $12 : 6 = 2$  (mathematical expression). If the colon is used to express a ratio, then the non-breaking spaces are also used with it: 5 : 3. In the case of the results of e.g., sports events as well as the duration of the event, the colon is used without spaces (for example a score of 5:3, and duration of 8:31.17 = 8 minutes and 31.17 seconds); see also the chapter entitled “Numbers and Units” on page 56.

---

<sup>11</sup>Combining the functions of a question mark and an exclamation mark [1].

## Quotation Marks [“ ” or ‘ ’]

Double quotes (“ ”) or single quotes (‘ ’) are used in English. The typographic opening quotes take the shape of digit six while the closing quotes look like nines<sup>12</sup>. The quotation marks are not separated with spaces from text enclosed within them. You can enter neutral quotes using the keyboard. Word processors commonly change neutral quotation marks to typographic ones, which may vary in result depending on the language setting. For example, in Microsoft Word, *Replace as you type “Straight quotes” with “smart quotes”* is checked by default in the AutoCorrect dialog, on the AutoFormat As You Type tab. In Microsoft Windows, you can also enter the English opening double quotes as ALT + 0147 and the closing ones as ALT + 0148.

### *Examples of Correct Use:*

The “quotation marks” are not separated with spaces from text enclosed within them. “If the entire sentence is within quotation marks, its closing punctuation stays with them as well.” Dad says: “Do come along with me.”

### *Examples of Incorrect Use:*

“These” are curly (quotes in reversed order). And "these" are neutral (vertical, typewriter, straight, dumb) quotes.

(Explanation: Typographic quotes take shapes of Arabic numerals six [opening] or nine [closing] positioned above baseline [at the ascender].)

## Brackets ( ) [ ] { }

Brackets are placed next to the expressions or sentences that are enclosed within them (whereas there are spaces outside the brackets if there is no punctuation mark right after the closing bracket). This means that there is a space before the opening bracket, but no space after it, and there is no space before the closing bracket, and there is a space after it. The pattern [ ( ) ] indicates the hierarchy of round, square, and curly brackets. Round brackets are the most commonly used in the text. Square or round brackets may be used for bibliographic citations. For the sake of graphic differentiation, it is best to use square brackets.

### *Examples of Correct Use:*

Birth of Planet (lecture and discussion).

<sup>12</sup>The similarity with the numbers is better seen when using a font other than Pagella.



### *Examples of Incorrect Use:*

General Motors would have you buy the “de Luxe” kit with every car, a card from Rand McNally ( GM subsidiary ), although you would never need it or want it. If you didn’t accept the package, you car would only be able to drive at half its design speed( if not more slowly )while General Motors would be facing federal investigation.

(Explanation: Both the first and second pairs of brackets have extra spaces inside of them; the text inside the brackets should be immediately next to the brackets. The second pair of brackets should have adjacent spaces outside of them, i.e., one before the opening bracket, and another after the closing bracket.)

## **Dots of Ellipsis [...]**

Dots of ellipsis as a single symbol or blank (key shortcut ALT + 0133) indicate an unfinished utterance (like a dash), pause within a sentence, omission of text, or of a list. When indicating omission of a part of a list, dots of ellipsis are separated from the preceding text by a comma and a space, otherwise they are placed immediately after the preceding text. A full stop is not used after dots of ellipsis.

### *Examples of Correct Use:*

The original idea was..., but it will be better like this.  
Humans have five senses: sight, hearing, ...  
Calm down or...!

More than three dots can only be used in a sequence if each dot indicates an omitted character in an expression.

### *Example of Correct Use:*

The planet closest to the Sun: M.....

## **Hyphen [-]**

Hyphen (-) is different from dash (–) and also different from minus sign (−), which are both dealt with further below. The hyphen has its own key on the keyboard. It separates syllables if breaking a word at the end of a line or joins words in some compound lexical items (mother-in-law, blue-and-white, set-up). You should follow one system of hyphenation consistently. If in doubt, refer to the same dictionary for all such words unless you copy the spelling from a reference (such as ‘non-breaking’ following the system in this document versus ‘nonbreaking’ from a reference to MS Word). You can alternatively rely on a spell checker selecting the desired system, that is a region where English is spoken. A hyphen is written without any spaces before or after it. If you want

to prevent a hyphenated word from breaking at the end of a line at the hyphen position, you can use a nonbreaking hyphen in MS Word by typing CTRL + Shift + hyphen, or (ALT + 0173), or by pressing the *Insert tab, Symbol button* in the Symbols group, and by selecting *More Symbols, Special Characters*, and finally *Nonbreaking Hyphen*.

*Examples of Correct Use:*

Low-budget event, well-known singer, well-built athlete (but well built house), mother-in-law, X-ray, twenty-three, ex-wife, self-evident, all-inclusive.

*Examples of Incorrect Use:*

X - ray, X – ray, X–ray, Xray.

(Explanation: No spaces are used before or after hyphen, hyphen is different from dash, some words are always hyphenated in all current systems of spelling.)

## **Dash [–]**

The *en dash* (–) is longer and thinner than the hyphen (-), and, if used to separate sentence sections, it is preceded by a space and followed by a space. The dash does not have its key on the keyboard. You can press CTRL + minus key (on the numeric pad) simultaneously or ALT + 0150 in MS Word, which sometimes changes to a dash through the AutoCorrect feature (if the item *Replace as you type Hyphens (-) with dash (–)* is ticked on the *AutoFormat as you type* tab in the *AutoCorrect* dialogue accessed through MS Word Options in the *Proofing* menu). Dashes are used to set off sections of a sentence in a stronger manner than commas. They must not be used at the beginning of line. An unfinished idea may also be indicated with a dash. If another punctuation mark is used after a dash, then they are not separated with a space and full stop is not used. You may also use dashes as an alternative to quotation marks surrounding direct speech or list items. If used this way, a dash may also be at the beginning of a line. Spaces are commonly used with a dash, except when the dash replaces prepositions, conjunctions, or expresses an entire monetary amount.

*Examples of Correct Use:*

If you don't understand some word in the sentence in a technical document, simply ignore it. You will find the text meaningful even without the word. No experiment should be considered a complete failure – at least, it can always be used as a bad example.

*Examples of Incorrect Use:*

Nothing ventured - nothing gained.

Nothing ventured–nothing gained.

(Explanation: The former example has a hyphen instead of dash, the latter does not have spaces around the dash.)

*Exceptions to the rule:*

1. Do not put a space after a dash if it is followed by another punctuation mark. Do not use a full stop after the punctuation mark in such a case either.

*Examples:*

Come on, you –!

I liked it but –.

2. The dash that means “through” to specify a range is not separated with spaces and it is not allowed to be the first or the last character in a line. In English it is recommended to use “to” instead of a dash.

*Examples of Correct Use:*

25–28 °C (25 to 28 °C)

pages 18–21

Monday–Friday

1st–5th class

*Exception from Exceptions:*

A dash may replace a hyphen in compound adjectives to join multiple compounds or to join open compounds, i.e., compounds where two or more words express one idea but are commonly not hyphenated using spaces between the words.

*Examples:*

non-business–non-pleasure (category) pre–World War Three (generation)

## **Slash [/]**

The forward slash [/] should never be used in pairs as a replacement for brackets, which is a typewriter legacy. It is used on its own mostly in fractions (1/4), physical units (km/h), and to indicate division (equivalent to the division sign). It may further be used to separate lines of poetry quoted in a continuous fashion, to separate groups of information (vertical bar can do this as well). If a slash meaning “or” separates one-word alternatives, there are no spaces before and after it; if the alternatives are open compounds or any multi-word expressions containing spaces, a space before and a space after the slash are used. Wrapping an expression after the slash to a new line is not advisable. The slash may be used as a separator in some types of expressions with numbers, such as dates and telephone numbers. There are many other common informal uses, but these are generally not recommended for the purpose of writing a thesis.

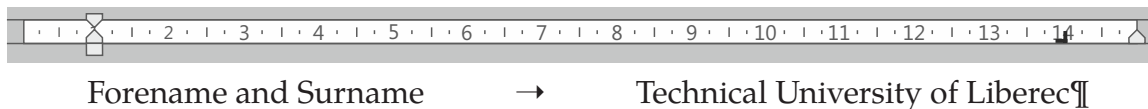
*Examples:*

1996/97 (academic year)  
AC/DC (alternate current, direct current)  
telephone/fax  
Act No. 586/1992  
magazine issue 12/99  
Language and Society / Langue et société

## Tabulator

The tab character should not be used to indent the first line in a paragraph. Indentation is specified in the paragraph format. A tabulator is used to align text vertically into columns unless it is more convenient to create a table, to number equations (formulas), and also if you want to align part of the text on the left, then insert a tab, and align another part of text on the right etc.

*Example of tab stop in Microsoft Word (tabulator and pilcrow non-printing characters displayed):*



## Section Sign [§]

If the section sign (ALT + 0167) is followed by a number, it is set off with a non-breaking space from it but replaced with the word “Section” if at the beginning of a sentence.

*Examples:*

Pursuant to § 13, paragraph 2...<sup>a</sup>  
Section 8 has been omitted in the contract.

<sup>a</sup>Proper English form is: Pursuant to Article 13(2)...

## Apostrophe [']

It is not separated from the expression it is part of with spaces at either side. The apostrophe (ALT + 0146) usually marks omission of a letter or group of letters, either as compared with full form spelling or as the result of the expression’s evolution. Other uses are possible.

*Examples:*

d’Artagnan, l’Humanité, Paul’s dog, parents’ names, doesn’t

## Ampersand [&]

The ampersand (ALT + 38) is used in the meaning of conjunction “and”, therefore it should not stand at the end of line. Therefore non-breaking spaces are used with it. The entire expression, the ampersand is part of, should be kept in one line. The symbol is a ligature of letters “e” and “t” (that is *et*, which means *and* in Latin).

*Example of Correct Use:*

Jones & Jones  
Sellier & Bellot

## At Sign [@]

The @ symbol (ALT + 64) is a representation of the preposition “at”. It is mainly used to separate the username from the internet domain in email addresses.

*Example of Correct Use:*

johnny.walker@tul.cz

## Percent, Per mille [% , ‰]

The percent symbol (ALT + 37) and the permille symbol (ALT + 0137) are placed immediately after Arabic numerals in English. International standards may prescribe use of a space to separate the numeral from the symbol (see [21, 25]). The symbols are mainly used in tabular layouts whereas verbal expressions should be preferred in running text.

*Examples of Correct Use:*

12 %  
11 % solution  
0.1 % = 1 ‰

*Examples of Incorrect Use:*

11%

(Explanation: The space between number and percent sign is missing.)

## Abbreviations

Some abbreviations are established short forms (e.g., etc., i.e.). Other abbreviations are initialisms (e.g., TUL), which comprise capital letters of the same size only. The use of dots may vary by the style preferred but should be consistent within a document.

*Examples of Correct Use:*

TUL, USA, BBC, Dr., vs., No., mW, Ltd., plc.

(Explanation: Abbreviations within corporate names and suchlike should be used the way they are registered regardless of generally applied rules or customs.)

## **Name Initials**

A non-breaking space should follow each name initial. Name initials at the end of a line should be avoided. Writing names out in full is preferred.

*Examples of Correct Use:*

J. R. R. Tolkien

Franklin D. Roosevelt

J. A. Komenský

A. Jirásek

## **Internet Addresses**

Internet addresses and email addresses should not be split into multiple lines. If necessary, split them at dots or hyphens. If the address is unambiguous in plain text, the protocol prefix, such as “http://”, is optional. If the Internet address is too long, then it is up to the author whether to use a URL shortener service. It is much better to work with such abbreviated addresses.

*Examples of Correct Use:*

[www.tul.cz/univerzita/70-let](http://www.tul.cz/univerzita/70-let)

... it is stated at the address [www.seznam.cz](http://www.seznam.cz)

<ftp://zive.cpress.cz>

The address <https://support.microsoft.com/cs-cz/office/dostupné-typy-grafů-v-office-a6187218-807e-4103-9e0a-27cdb19afb90> can be shortened to <http://bit.ly/45nN0cM>.

## **One-letter Words**

These are virtually only the pronoun “I” and the article “a” in general English. You should avoid placing such words at the end of a line. This may be achieved by putting a non-breaking space between the one-letter word and the following word, rather than a normal space. In MS Word, you can enter a nonbreaking space with the keyboard shortcut CTRL + Shift + space. Another method is to use the keyboard shortcut ALT + 0160. Some text editors enter non-breaking spaces after one-letter words automatically if set. This is possible by ticking the relevant option on the *AutoFormat As*

You Type tab in MS Word for some languages but not for English. In the chapter *Inseparable Elements and Word Hyphenation* (page 57) you will find further examples of recommended use of non-breaking spaces to prevent expressions from breaking into two lines.

*Examples of Correct Use:*

In any formula (especially one taken from a technical manual), the constants listed must be treated as if they were variable values. And that's the way it should be...

*Examples of Incorrect Use:*

In any formula (especially one taken from a technical manual), the constants listed must be treated as if they were variable values. And that's the way it should be...

(Explanation: You need to put a non-breaking space after the indefinite article, as a one-letter word, to prevent it from becoming the last word in the line.)

## **Dates and Times**

If the month is shown as a number, the preferred date format is day, month, year with a forward slash after each number (e.g., 18/02/1997). Another option is verbal representation of the month while there is no dot or ordinal number suffix after the day number (18 February 1997). The current year is given as a group of four digits with no separators within the group. A short form of the last two digits is only allowed after a dash or slash when showing a range of years (in 1997–98) or a turn of years (academic year 1997/98). The spaces to separate the numbers in a numeric date notation should be non-breaking to prevent breaking the date at the end of a line. Another way of writing the date is by separating the numbers with hyphens in format YYYY-MM-DD (2024-02-29). This format complies with international standards ISO 8601-1 and ISO 8601-2 [10, 11].

According to [22, 23], hours in connection with minutes are separated by a dot without a space after the dot, and minutes are expressed by a two-digit number (9.05). It is possible to use a colon as a separator of hours and minutes instead of a dot, in which case the hours are written in two digits (09:05). This clearly distinguishes times from dates. If seconds and fractions of seconds are shown using decimal notation, a colon separates seconds from minutes and decimal point separates seconds from its fraction (1:05:30.45 – 1 hour, 5 minutes, 30 seconds and 45 hundredths of a second).

## Degree [°]

The degree symbol is mainly used to stand for degree of arc, angle, longitude, latitude or degree of temperature in conjunction with numeric values in Arabic numerals. No space is used between the degree symbol of arc, but there is the space if degree symbol of temperature is used.

*Examples:*

360°12'8''

(Means: Three hundred sixty degrees, twelve minutes, 8 seconds.)

36.1 °C

(Means: Thirty-six point one degrees Celsius.)

## Numbers and Units

A decimal point is used to separate the integer from fraction in the decimal number notation. For ease of reading, digits are often grouped by three while the separator, sometimes referred to as a thousand separator, is a comma. Not using the thousand separator if the total number of digits is four is recommended. It is further recommended you avoid a large number of digits after the decimal point by choosing a suitable unit of measure if at all possible.

Simple numbers in text are optionally spelled out as words (five times five as opposed to  $5 \times 5$  or five million as opposed to 5 000 000 or 5,000,000); consistent approach is essential. You further have to spell out any numbers at the beginning of a sentence (except years).

Ordinal numbers in Arabic numerals are suffixed with the two-letter ending of the number in words or spelled out (5th place – fifth place). This suffix may be typed in the superscript form while it is usually dropped altogether in dates where the month is spelled out as a word or its abbreviation). Compound adjectives with numbers are normally hyphenated (twenty-pound banknote, 300-page book). The possessive form may alternatively be used for lengths of time (five-second delay or five seconds' delay). The multiplication symbol, times, is the cross character (ALT + 0215) ( $\times$ ), not the letter "x" (33x). The symbol is used with spaces. If you use the plus or minus sign before a number, no space is used ( $+5\text{ }^{\circ}\text{C}$ ). The correct minus sign character is similar to a dash, but its vertical position is aligned with the plus sign ( $-5\text{ }^{\circ}\text{C}$ ). If the minus sign character is not available in your system, use the dash instead ( $-5\text{ }^{\circ}\text{C}$ ).

The number and the following unit of measure are typed together with the *nonbreaking space*. In English written texts space between number and unit is not usually used. In this textbook we prefer European Standards [25] and Standards of NIST [21].



The number and the following unit of measure are typed together with a nonbreaking space (12 m: twelve meters). Units for numbers in the meaning of an adjective are written without a space (12m: twelve-meter).

There are special characters to type inches, feet, minutes, and seconds (see Table 2).

*Examples of Correct Use:*

10 m (ten metres)  
50 A (fifty amperes); 3 m<sup>2</sup> (three square metres); 6 min (six minutes of time); 6' (six minutes of arc or six minutes of time informally); 4 cm (four-centimetre) section; 10 kg (10 kilograms) of apples; 5 × 8 (five times eight); 20 % (twenty percent) discount; eightfold speed; 33-fold increase; five-metre ladder; two-weeks' holiday; 10:00 (ten o'clock); 5:02.467 (five minutes, two point four six seven seconds); 5 min 2.467 sec; \$8,235.28; \$8 235.28

(Note: Be careful in using "m" as a unit. It has two meaning in English written text, either "meter" or "mile".)

*Examples of Incorrect Use:*

3m<sup>2</sup>; £47567; £47.567.60; 10m

(Explanation: There is no space between number and unit and the upper index numbers are not separated with a space from the preceding expression; thousand separator is convenient if a string exceeds four digits; the thousand separator must be different from the decimal separator.)

## Text Wrapping and Hyphenation Restrictions

Line breaks should not occur between ordinal groups of digits inside number (1,523,654), between a number and the unit of measure symbol (5 km), between the abbreviation of an academic title and the name (prof. Spondej), between the abbreviation of the name and the surname (A. Spondej). Compounds with a numeric element, such as dates with month spelled out as a word or abbreviation, should not be split (14 March 1708). You should further avoid any single-character expressions at the end of a line.

To make sure your text editor does not break text in a restricted way, you should use non-breaking spaces with inseparable expressions (CTRL + Shift + space bar in MS Word or ALT + 0160); see the paragraph entitled *One-letter Words* (page 54).

Words can only be hyphenated at the syllable level. Syllable structure can be checked with a good dictionary. If feasible, hyphenation to break words at the end of line due to text wrapping should be avoided altogether. Where hyphenation is optional, consistency within the document should be maintained.

*Example of Incorrect Use:*

An explosion occurred in the H. mine on 12 December 2022, fortunately without casualties. However, under these conditions it is impossible to interpret. It is better to have the translation ready. This morning, I met a famous writer in my favourite cafe Na Ružku. Have any of you visited your local library? It's not far away and it's a nice building.

## **Titles**

The use and exact syntax of professional and academic titles with names varies from country to country or from region to region.

You should use the titles in way their holder would use them consistently throughout the document.

*Examples:*

John Doe M.Sc.  
Dr. Jane Jackson

## **Character Codes**

Keyboard shortcuts for inserting special characters are mentioned in the previous text. There are various different character sets for which there are different formats of character encoding<sup>13</sup>. Examples of frequently used character sets (based on ASCII encoding - American Standard Code for Information Interchange are given in Table 2.

Let's take an example using the code ALT + 0163 and look at the dependence of the printed character on the selected character set. In the character set for Central Europe this code stands for the following character: Ě. If the keyboard, and thus character set, is switched to an English layout, the ALT code produces the pound sterling symbol: £.

Windows offers character insertion not only by combining the ALT key and the appropriate code, but also by inserting a character from the *Character Map* application.

---

<sup>13</sup> ASCII, Windows-1250, UTF-8, Unicode, etc.

**Table 2:** List of useful characters

ALT	Char	Description	LaTeX
0034	"	double straight quotes	\verb "
0035	#	pound sign, number sign, hashtag	\#
0036	\$	dollar symbol	\\$
0037	%	percent symbol	\%
0038	&	ampersand	\&
0039	'	straight apostrophe	\verb '
0064	@	at sign	@
0092	\	backslash	\textbackslash
0096	`	grave accent	\verb `
0124		vertical bar	\mid\$ or
0126	~	tilde	\textasciitilde
0128	€	euro symbol	\texteuro or €
0130	,	comma, (Czech curly single open quote)	,
0132	„	Czech curly double open quote	\quotedblbase
0133	...	dots of ellipsis	\dots or ...
0137	‰	permille	\textperthousand or ‰
0145	‘	curly single open quote	`
0146	,’	curly apostrophe, curly single close quote	,
0147	“	curly double open quote (Czech curly double close quote)	\textquotedblleft or ``
0148	”	curly double close quote	" or ''
0150	–	en dash	--
0160		non-breaking space	~
0167	§	section sign	\S or §
0169	©	copyright symbol	\textcopyright or ©
0176	°	degree	\textdegree or °
0182	¶	pilcrow	\P or ¶
0215	×	times	\texttimes or ×
8242	′	prime (foot, minute of arc)	^\prime\$
8243	″	double prime (inch, second of arc)	^\prime\prime\$
8722	−	minus	-\$-\$

## E Peculiarities of English Text Formatting

Each final thesis written at TUL contains at least the title of the thesis and the abstract written in English. Therefore, it is appropriate to mention the basic rules of English typesetting and the typical mistakes made by Czech writers.

### E.1 Czech Typographic Conventions

There are a good number of differences between English and Czech typographic and text formatting rules. If you are writing your thesis in Czech, you should refer for the Czech conventions in the Czech version of this document, “Metodika zpracování bakalářských a diplomových prací” [14].

### E.2 Writing the Title in English

Writing headings and titles in English is slightly different from writing in Czech. When writing text using small and capital letters, it is necessary to respect the sizes of the respective letters. In English, in most cases, the initial letters of the words of the title are capitalised, whereas prepositions and articles are not capitalised. An example can be a sample on the title of the fictitious work used in this document:

- Czech: *Jak se nezbláznit při psaní závěrečné práce*
- English: *How Not to Go Mad When Writing a Thesis*

*Comment:*

At this point, it would be appropriate to recall that the correct English name of our university is Technical University of Liberec, which often leads to the incorrect writing of the Czech name Technická Univerzita v Liberci.

(Explanation: it is wrong to capitalise the letter “U” in the word “Univerzita”)

One solution could be to use capitals (uppercase letters for the entire text). However, when writing longer text, the readability will certainly decrease.

### E.3 English Abstract and Keywords within Czech Thesis

Chapter 2.1.6 deals with the abstract in general. In the following text, we will therefore only focus on frequently recurring mistakes when writing an English abstract, or keywords, which can be divided into three groups.

## **Spelling and Grammatical Errors**

It is possible to minimise these errors by using a spell check in a text editor, or by asking an expert or a person with better language skills to translate / proofread the text (certainly do not rely on computer translators or artificial intelligence (AI) capabilities).

## **Inconvenient Abstract in Czech**

The abstract should be concise and to the point without long sentences. Literal translation of a multi-line abstract consisting of a single sentence is literally a nightmare for translators.

## **Incorrectly Used Technical Terms**

When translating the Czech abstract / keywords into English, it is advisable to study the corresponding English terminology from the issue being addressed. Self-translation of terms that have a fixed form could lead to misunderstandings.

## **E.4 Writing the Whole Thesis in English**

There are study programmes in English at the Technical University of Liberec. In order to successfully complete them, in addition to the title, abstract, and keywords, the whole thesis must be written in English. The main typographic and text formatting rules are included in these guidelines. Another useful source of information recommended is a publication by a team of authors of the TUL [6], which not only covers the topic of writing academic papers but also writing other documents (presentations, curriculum vitae, correspondence, etc.) in English.

## F Options for PDF Conversion

At TUL, final theses are submitted electronically by uploading them to the Study Agenda Information System (IS STAG). The electronic file must be in the prescribed PDF format as well as any attachments in a format appropriate to the nature of the attachment (technical drawings, source codes, videos, ...). The submitted PDF file has a mandatory structure in terms of the sorting of the sheets is concerned. The general structure is as follows:

1. *Title page, thesis assignment, and declaration.* This front matter is generated by IS STAG. There is no need to sign and scan them, they are inserted into the form downloaded from IS STAG (they are also in PDF format),
2. Acknowledgments (optional),
3. Abstract in Czech and English. If the language of the Bachelor's thesis is not Czech or English, in addition annotation in the language of the thesis,
4. Keywords in each language in which the abstract is given,
5. Contents (as well as a list of images, tables, graphs if required),
6. List of abbreviations given alphabetically,
7. Text of the thesis,
8. Bibliography,
9. List of appendixes,
10. Appendixes (that are part of the final thesis document).

The pages from point 1 must therefore be attached to the final thesis (points 2 to 10) so that one PDF file is created for submission. In the case of printing and binding, the original pages with signatures are inserted. As has already been mentioned several times, in order to follow the correct procedure, it is necessary to refer to the relevant Rector's Directive [19].

The resulting submitted electronic document consists of two parts, i.e., usually the pages generated from IS STAG and the text of the thesis created in the selected text editor. These parts need to be combined into a single electronic document before submission. The document prepared in this way is then uploaded to IS STAG in the prescribed PDF format.

## F.1 Options for PDF Conversion

For the thesis text, the most feasible option is to export or save to PDF from the text editor used. The most frequently used editors MS Word and LO Writer have a function for saving to PDF without the need to install a virtual printer. When writing in the LATEX system, a PDF document is generated directly after the compilation<sup>14</sup> of the source text.

In the event that an “exotic” application is used to compile the final thesis, which cannot export to PDF format, a similar result can be achieved by using a so-called PDF printer, when a PDF file is created by printing on a so-called *virtual printer*. It is possible to try either the pre-installed *Microsoft Print To PDF* printer that is part of the Windows installation, or to install a third-party driver. Alternatively, it is possible to install additional software that will add its driver to the system and also enable the subsequent connection of PDF documents. Verified applications of this type include *PDFCreator* (free download at [www.pdfforge.org](http://www.pdfforge.org)), *PDFPrinter* (free download at [www.bullzip.com](http://www.bullzip.com)), *doPDF* (free download at [www.dopdf.com](http://www.dopdf.com)), *PDFreDirect* (free download at [www.exp-systems.com](http://www.exp-systems.com)) or use a commercial product (*novaPDF*, *primoPDF*, *PDFreDirect Pro* (Professional) or *pdfFactory*) if you own one. Nevertheless, there are many others.

## F.2 Options for Merging and Splitting PDF files

Most of the available applications manage not only the necessary merging of PDF files, but also their splitting, and file conversion, etc.

### F.2.1 Use of Online Services

This is probably the fastest way of merging or splitting PDF documents, but it is also the most vulnerable to problems due to different PDF file versions and their particular properties. *Merge PDF* ([foxyutils.com](http://foxyutils.com)) is a service that has proved useful. There are other suitable online applications, such as *PDF24 Tools* ([tools.pdf24.org](http://tools.pdf24.org)) or a PDF merging service *PDFCombine* ([www.pdfcombine.com](http://www.pdfcombine.com)).

### F.2.2 Specialised Desktop Applications

Of course, the most reliable method is to use tools from the author of the PDF format, i.e., *Adobe Acrobat Pro*. However, there are more affordable yet powerful tools, such as *PDFTools* ([www.pdfxchange.cz](http://www.pdfxchange.cz)), *soda PDF* ([www.sodapdf.com](http://www.sodapdf.com)) or even the free of charge *PDF Split & Merge* (free to download at [www.pdfsam.org/download](http://www.pdfsam.org/download)), *PDFill* (free download at [www.pdfill.com](http://www.pdfill.com)), *PDFreDirect* (free download from

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<sup>14</sup>Implementation of pdfL<sup>A</sup>T<sub>E</sub>X, X<sub>Y</sub>L<sup>A</sup>T<sub>E</sub>X, LuaL<sup>A</sup>T<sub>E</sub>X.

[www.exp-systems.com](http://www.exp-systems.com)). The last of these applications can be recommended, as it is reliable, easy to use, and there is also a professional version available for a fee with further PDF-related features, for example to support page splitting.

### F.2.3 Use of L<sup>A</sup>T<sub>E</sub>X Options

As mentioned in the previous section, the direct output of new implementations of the L<sup>A</sup>T<sub>E</sub>X system is a PDF file. While creating a document, it is possible to work with illustrations or tables in PDF format. This is also true for entire pages. When using a suitable package, for example `pdfpages`, L<sup>A</sup>T<sub>E</sub>X allows the merging and splitting of PDF files without the need to install or use other applications.

### F.2.4 Virtual PDF Printers

A virtual printer usually stores each file in a print queue, which generates a single PDF file all at once. However, this method does not allow the pages of the PDF file to be easily split.

As can be seen, there are many options, and there are still many others, as the saying goes: “You just can’t stop progress!” The solutions that are given here are not dogma and will always depend on the specific needs, intentions, possibilities, and experiences of each individual user.

One essential requirement for a thesis in a PDF file, besides accurate visual reproduction, portability, and independence of software used to create the document, is text search capability. That is why you need to generate a document as the PDF/A version at the PDF/A-1a level of compliance (see the next chapter). Therefore, do not forget to check this function before uploading the document to IS STAG.

To facilitate seamless merging, do not use any password protection at any level or attach an electronic signature in the primary PDF files. These features should only be used in the final document, if at all.

## F.3 PDF in More Detail

The name, “Portable Document Format”, suggests you can view it regardless of your computer platform or its configuration. The format preserves the original document appearance as produced in a text editor or any other computer application of your choice and convert the document to PDF format only at the time of publication.

The PDF is evolving so there are different versions (PDF 1.0 through PDF 1.7 ext. 5). Newer versions mainly support new types of objects. There are further PDF specification subsets focused on different documents structures. For the purpose of publishing a thesis, the PDF/A subset standardised for archiving is the most suitable. This PDF/A



specification subset is aimed at viewing compatibility with any future software concerned. The PDF/A subset was originally based on PDF 1.4 while the specifications have been updated to comply with PDF 1.7 as well as standards ISO 19005-1:2005 [7] and ISO 19005-2:2001 [8]. The reduced specifications mainly differ from the full specifications as follows:

- All data required for correct viewing are embedded in the document (fonts, colours, etc.),
- All metadata are in the XMP format,
- No encryption or password protection etc. is included,
- No audio or video contents are supported,
- No JavaScript or other executable codes are included,
- LZW compression is not used.

Bear in mind, however, that the PDF/A specification subset currently has three levels:

#### **PDF/A-1**

**Level “b”** is based on PDF 1.4 (compliant with ISO 19005-1:2005), provides accurate visual reproduction, but does not guarantee support to structural or semantic information.

**Level “a”** is also based on PDF 1.4 (compliant with ISO 19005-1:2005), but unlike PDF/A-1b, it supports structural and semantic information (text search within the document being a principal benefit).

**PDF/A-2** is based on PDF 1.7 (compliant with ISO 32000-1:2008 [9]), mainly differing from PDF/A-1a in supporting JPEG2000 compression, transparent layers and effects, and electronic signatures, etc.

**PDF/A-3** has been supplemented with machine-readable XML.

Many computer applications, whether text editors, graphic editors, or various design systems, now have the option of exporting to PDF. However, it is not always possible to specify to which PDF version the export is performed. It is therefore sometimes necessary to specify the export parameters manually or perform a subsequent conversion to PDF using a virtual PDF printer or a PDF conversion application. In any case, it is always necessary to check the behaviour of the created PDF file.

Some other PDF versions may be encountered in practice. One of them is referred to as searchable PDF, or sPDF. Although searchability is also available in PDF/A-1a, it means something different here. Mainly production machines and their specialised software

store their files in this format. A document is scanned and saved in sPDF format. The pages are saved as a raster image for accurate visual reproduction while the text is converted using Optical Character Recognition (OCR) to a special hidden layer. This allows text strings to be searched while keeping the true form of the document.

Another special type is called linearised PDF, sometimes referred to as optimised PDF, for fast web browsing. In addition to optimising the file size, its structure of the document saved in this way allows its first page to be viewed in a web browser before downloading and rendering the entire file on your computer. Most other PDF versions support different professional applications: PDF/E for interactive exchange of engineering documents, PDF/X for graphic content exchange in the printing industry, PDF/VT for variable and transactional data printing. These formats are directly supported by applications in which PDF export is built-in (for example, AutoCAD will allow you to control layers in drawings).

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