



OULUN YLIOPISTO  
UNIVERSITY of OULU

## **Formal Instructions for Master's Thesis**

University of Oulu  
Department of Information Processing  
Science  
Master's Thesis  
First name Last name  
Date

## Abstract

Abstract is needed to sum the master's thesis up. The abstract is to be uploaded into Optima before the final grading of the thesis. Please find the current information about the format given in Optima.

The guide includes instructions for students. It is written keeping in mind the idea that the user may utilise it e.g. by pasting his or her text on the current text. The contents include information about formatting the text, positioning tables and figures, among other things. In addition, the use of proper literature is instructed. Even if there is no strict structure for the thesis, a recommendation is offered in this guideline.

One important guideline for the text is that do not write too short paragraphs. For instance, if there is only one sentence in a paragraph, the sentence must be really important and influential to form a paragraph of its own.

It is not possible to provide information in a guideline like this for all issues related to master's thesis. For example, the research process, ways to acquire research material and its analysis are excluded in the guideline. On the other hand, a structure for a research plan is provided in the appendices.

### *Keywords*

first keyword, second keyword, other keywords

### *Supervisor*

Title, position First name Last name

## Foreword

The foreword is not instructed by the supervisors. In other words, the student may write in this section what she or he wants to share with readers. However, it is a custom to thank all those who have contributed to the research somehow. When acknowledging people, their affiliations are given (e.g. Professor, University Lecturer, Adjunct Professor, Mrs.)

This guideline is based on the previous version that was written in Finnish and finalised by Dr. Lasse Harjumaa in January 2007. This version is to replace the earlier version. I want to thank all those people who have contributed to the earlier versions and this newest version, the first written in English.

Hopefully this guideline will serve both students and faculty with its instructions that include both formal and informal regulations and recommendations. In the first phase, the constructive comments are received with pleasure by [raija.halonen@oulu.fi](mailto:raija.halonen@oulu.fi).

Raija Halonen

Oulu, August 15, 2014

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# 1. Introduction

In the thesis we follow the style introduced by The American Psychological Association (APA). The APA style can be found easily in the Internet and some sites provide a quick guide, too. E.g. [http://www.waikato.ac.nz/library/learning/g\\_apaguide.shtml](http://www.waikato.ac.nz/library/learning/g_apaguide.shtml) and <http://owl.english.purdue.edu/owl/resource/560/01/> are useful links.

It is important to follow given instructions. In academic theses, not only the content but also the format is important. Generally every academic publication forum requires that the publications follow their guidelines. In the theses accepted in the Department of Information Processing Science the format is APA. Currently there are several editions published from APA. The general rule is that the latest available edition is applied. Currently the newest edition is 6<sup>th</sup>. If a thesis is already in process it is not needed to transfer it into a newer edition of APA. Whichever you apply, do it consistently.

In addition to teach the students to follow given formal instructions, the guideline aims to unify and standardise the outlook of the theses made in the department. The guideline also enables the supervisors to focus on the content of the theses as the students already consider the outlook and format themselves. In this sense, it is a question of available resources for supervision and guidance.

The use of language and grammar cannot be discussed in detail in this kind of guide. However, the writing style should meet the general academic writing styles in the sense that no causeries are accepted or other lightweight texts such as jokes or rumbings. In other words, in academic theses all writing must be appropriate and reasonable. There are several guidebooks for academic writing available in the Oulu University Library, for example, and in the Internet. For those who write their thesis in Finnish there are books such as *Tieteellinen kirjoittaminen* (Kinnunen & Löytty, 2002). The style reference by APA (American Psychological Association, 2010) offers fruitful practical hints for writing thesis in English.

As the guideline is written according to the instructions, it enables the students to copy their text (without format) on the document and thus get their text into the right format. The format is to be used in the Bachelor's Theses and in the Master's Theses. In case of other theses, essays or reports it is recommended that the students inquire their teachers if the guideline is to be followed or not.

The structure of the guideline is as follows. The formal instructions for different topics are presented next. This is followed by examples of references and their use. After that the structure of theses and its writing style is discussed briefly. The guideline ends with a summary.

## 2. Formal Instructions for Text

Every chapter starts with text. The text acts as a short introduction for the following paragraphs and chapters. The introduction informs the reader of what is to be waited next. In addition, it helps to build a contextual clearness. A proper outlook gives a positive influence of the thesis and its author. If the outlook is confused and disorganised the thesis appears negatively even if the content was reasonable. Next, the outlook and writing of theses are described.

### 2.1 Title page

The name of the thesis is written positioned 13 cm from the upper edge of the title page by the font Arial and size 20. A potential sub title is written by Arial size 16. On the right bottom of the page starting from 9 cm the name of the university, department, type of thesis, the author and date are written. If the thesis is an exercise, the student number is needed to ease crediting the performance.

### 2.2 Text and headings

The thesis is written with Times New Roman (or similar) with single line spacing. The font is 12 points. The paragraphs are written without indentation and are separated by one empty line (12 p). Except the main headings, the headings are written by small alphabets. The main heading is in Arial font size 18 and sub headings Arial font size 14. The main headings start new pages. The heading is positioned after 48 point empty space and after the heading there is 24 point empty space. The subheadings are preceded by two empty lines (24 p) between the subheading and the following text there is empty space of one line.

On the left there is 4 cm margin to ease stapling. All other margins are 2 cm. If the amount of pages is more than 80 pages, it is recommended that the thesis is printed and stapled double-sized. In this case the margins must be mirrored. This is done e.g. in Word: Page Setup – Layout – (Headers and footers) Different Odd and Even.

According to generally adopted style, there may not be consecutive headlines. Therefore introductory text is needed after headlines before following headlines. The headlines may not remain alone without the actual text on the same page. Instead, the headlines must be tied with the following paragraph.

### 2.3 Tables, figures and lists

Tables must be numbered and named by a title. The numbering is running from the beginning of the thesis. The titles are positioned above the tables. Above the title there is space for one empty line (12 p) and below 6 points. The text must be referred according to its number. Referring by “see below” or “in the next table” is not sufficient. Table 1 sums the font styles that are used in the theses.

**Table 1.** The heading styles in the theses.

	Font Style	Size	NB
Heading0	Arial	18	No numbering
Heading1	Arial	18	
Heading2	Arial	14	
Heading3	Arial	14	
Heading4	Arial, italics	12	No numbering, not recommended
Body text	Times Roman	12	
Table title	Arial	10	Note the bolding
Figure title	Arial	10	Note the bolding

A table should not divide on two or more pages. Instead of a too long table it is recommended to build several smaller tables or to consider if there are more suitable formats to present the information such as appendices. If the contents of the table or the table as is are copied from another publication it must be cited properly. See the referencing guide.

Pictures must be numbered and named by a title. The numbering is running from the beginning of the thesis. The title is placed below the picture. Below the title is an empty space of one line (12 p). Above the picture is an empty space of 6 p. The picture is referred by its number in the text. If the picture is narrower as the body text, it is centred (see Fig. 1).

A good hint to insert a picture is to add a table (Table – Insert – Table - 1 column, 1 row, Autofit to contents) first, and then paste the picture into the cell. Thus the picture does not float over the text and margins when editing the document. Remember to remove the table borders. Always keep the titles near the tables and pictures.



**Figure 1.** Example of a screen caption. In case of a long title it is indented by 1.7 cm from the left margin.

According to Finnish Laws, pictures are under legal protection. They must not be copied without permission. There are exceptions such as pictures that consist of statistical information or are produced only from numerical data. Again, proper referencing must be followed (see the APA referencing style).

Lists are used when summing issues. In academic writing the use of lists should be minimised. The lists are indented. Also lists must be discussed in the text. Similar to tables and pictures, the interpretation must be given by the author regarding lists, too.

- A list is indented.
- The topics are talked in the body text.
- A chapter must not be ended with a list.

A list may also be numbered. In the next list you can see the styles utilised in the guideline.

1. ListItem
2. ListItemLast
3. ListItemNumbered.

Every picture and table must be referred in the text. Before picture and after picture there must be body text. Thus, a chapter may not begin or end with a picture, table or list.

## 2.4 Emphasis and citations

Emphasis may be used in case the topic is really significant or it must be separated from the surrounding text. For emphasising, there is a style of Emphasized. It is done by italics.

Direct citations must be made carefully. Short citations can be presented in the body text by parenthesis and including reference but longer citations are separated by making them as a paragraph and indenting it. It is important to add full references as instructed in the APA style (American Psychological Association, 2010).

## 2.5 Examples of codes and formulas

Code is presented by Courier New with size 10. The code must be explained in the body text (exception: it is axiomatic). Long lists of codes should be avoided.

```
public class B extends A {
    public void setProp(String s) {
        this.prop = s;
    }
    private String prop;
}
```

The style CodeSample is defined for the examples. Other than tables and pictures, code examples are not numbered.

Formulas are presented in the body text centred. If possible, general fonts are used. The following is a classic example of a formula.

$$E = mc^2 \tag{1}$$

The formulas are numbered similar to tables and pictures. The number is placed on the right side. The chapter may not begin or end with a formula.

## 2.6 Footnotes

Footnotes may be used if they bring true additional value into the text. The references must be listed in the list of references, not in the footnotes. The footnotes may extend the discussion of concepts, for example.

The footnotes are seldom really necessary. Therefore their use should be avoided. Every footnote is numbered and it is presented in the bottom of the page it is referred to.

## 2.7 Page numbers

Every page from title page to last appendix is numbered. However, the title page may not show the number. The number is placed 1 cm from upper edge and 2 cm from outer edge.

If the thesis is printed double-sided the mirror margins should be adopted. The page number must always stay on upper edge.

## 2.8 Contents

The table of contents includes all sections of the thesis from the abstract to the last appendices. The headings are indented so that the left column of the next level is even with previous column (Fig. 2). In the table of contents the line spacing is 1.

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**Figure 2.** Example of the list of contents.

The table of contents should show only three levels of titles, in maximum. This is valid even if the thesis contains four heading levels. The table is titled by Contents.

### 3. Use of References

The use of references includes both referring and building the list of references. In the thesis, the tasks follow instructions given by American Psychological Association (2010) versions 5 or 6.

#### 3.1 Importance of references

In scientific writing the arguments are reasoned by using references. The references should discuss with each other and they should be examined critically. Using references does not mean borrowing text. Direct citations are only seldom needed. Instead, the author should consider the ideas retrieved from the original research and then write the ideas with his or her words. Despite that, the exact reference must be given.

A proper and rigorous use of references is a significant part of writing an academic thesis and any scientific paper. It is not only the outlook of the references and their list but the references allow the thesis to be anchored as part of a wider research field and then evaluate its significance and value there.

Special attention must be paid on all text and output that origin from other's work and ideas. Proper use of references ensures that no plagiarism or other misappropriation is done. For further information, see <http://www.oulu.fi/urkundsystem/>

#### 3.2 Reference style

The APA reference guides how to make different kinds of references. The guide is versatile and it offers guidance about style and grammar matters, as well. The guidance is available also on APA website<sup>1</sup>.

For example, the instructions guide how to place a reference that refers to a single sentence or to several consecutive sentences. A general rule is that a reference after a paragraph refers to the whole paragraph while a reference at the end of a sentence refers to the one sentence only. In other words, the paragraph is based on the reference that is mentioned at the end of it. It is important to note the place of full stop when referring as it differs according to the usage of reference. The most important rule is that the reader must be aware of where the thought comes from - whether it is from prior literature or from the current study.

The next two examples are congruent:

Charness and Boot (2009) mark how bad design in technology is a potential reason to cause fear.

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<sup>1</sup> <http://apastyle.apa.org/>

Bad design in technology is a potential reason to cause fear (Charness & Boot, 2009).

Both of the sentences root from one origin that is shown differently in the sentences. Mark the place of the full stop after the parenthesis.

In case of the original paper with its interesting results is not available it is referred as follows “As Lewin (1945) reported in his study on work practices (as cited in Rapoport, 1970), the tasks ...” and the article of Rapoport is listed in the references.

The next paragraph shows how several sentences are referred to. Mark the place of the full stop:

Action research is a unique qualitative research method because it associates research and practice (Avison, Lau, Myers & Nielsen, 1999). Action research is argued to be ideal for studying information systems in practice because it serves different interests and it offers good means to improve practice in general. While action research combines theory and practice, it combines also researchers and practitioners through change and reflection. (Avison et al., 1999; Baskerville & Wood-Harper, 1998.)

In case of a specific section (table, picture, list) it is necessary to enter the page number in the reference, for example (Lewis & Loftus, 2000, p. 185). In addition, if the referred section in the original source is difficult to find, the page number is recommended in the reference.

Table 2 clarifies how to use ‘et al.’ in the thesis:

**Table 2.** Use of ‘et al.’ in the body text (Lee, n.d.).

Number of authors	First text citation	Subsequent text citations (all)
One or two	Palmer and Roy (2008)	Palmer and Roy (2008)
Three, four, or five	Sharp, Aarons, Witttenberg, & Gittens, 2007	Sharp et al., 2007
Six or more	Mendelsohn et al., 2010	Mendelsohn et al., 2010

As shown in Table 2, two authors are always listed. If there are more than six authors, only the first author is informed in the citations. A special note regarding the list of references: if there are more than six authors only the first six authors are listed followed by three full stops ...; and then the name of the last author is listed. (See the examples in the next chapter.)

### 3.3 References

The list of references is presented alphabetically according to the APA reference style. Line spacing is 1. The chapter is one of the main chapters (style Heading0) but it is not numbered.

It is wise to generate the list of references with the help of RefWorks. However, it is not extraordinary to note that some items in the list need further editing to meet the required APA standard.

As described in the APA reference style, the article sources influence the output format. The Internet offers good advice to apply the APA reference style, e.g. [www.waikato.ac.nz/go/apa](http://www.waikato.ac.nz/go/apa) is a nice short guide. Next, some examples are given:

Book:

Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1995). *Design patterns: Elements of reusable object-oriented software*. Boston, MA, USA: Addison-Wesley Longman Publishing.

Halonen, R. (2012). Online discussion forum as a means of peer support. In N. Wickramasinghe, R. Bali, R. Suomi, & S. Kirn, S. (Eds.), *Critical issues for the development of sustainable E-health solutions* (pp. 149-161). New York, USA: Springer.

Journal article:

May, D., & Taylor, P. (2003). Knowledge management with patterns. *Communications of the ACM*, 46(7), 94-99.

Eerola, T., Lensu, L., Kalviainen, H., Kamarainen, J.-K., Leisti, T., Nyman, G., ... Oittinen, P. (2010). Full reference printed image quality: Measurement framework and statistical evaluation. *Journal of Imaging Science and Technology* 54(1), 1-13.

Conference article:

Beck, K., Coplien, J. O., Crocker, R., Dominick, L., Meszaros, G., Paulisch, F., & Vlissides, J. (1996). Industrial experience with design patterns, *Proceedings of the 18th International Conference on Software Engineering*, 103-114.

Suhonen, K., Vaataja Heli, Virtanen, T., & Raisamo, R. (2008). Seriously fun: Exploring how to combine promoting health awareness and engaging gameplay. *Proceedings of the 12th International Conference on Entertainment and Media in the Ubiquitous Era*, Tampere, Finland. 18-22. doi: 10.1145/1457199.1457204

Internet article:

Farah, J. (2006). CM: The Next Generation - Agile Configuration Management. Retrieved January 5, 2007, from <http://www.cmcrossroads.com/content/view/6761/202/>

Specifically, no full stop is needed after the entry in case of Internet address.

Please note that even if the examples were given separately divided by the outlet (book, article, etc.) the total list of references must appear alphabetically as guided earlier.

### 3.4 Tools

It is recommended that generating the list of references RefWorks or other tool designed to help in managing references. Information about RefWorks is available in the Oulu University Library and on its WWW-site<sup>2</sup>.

By the way, remember to avoid such short chapters and paragraphs in the thesis as this one.

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<sup>2</sup> <http://www.kirjasto.oulu.fi/refworks/>

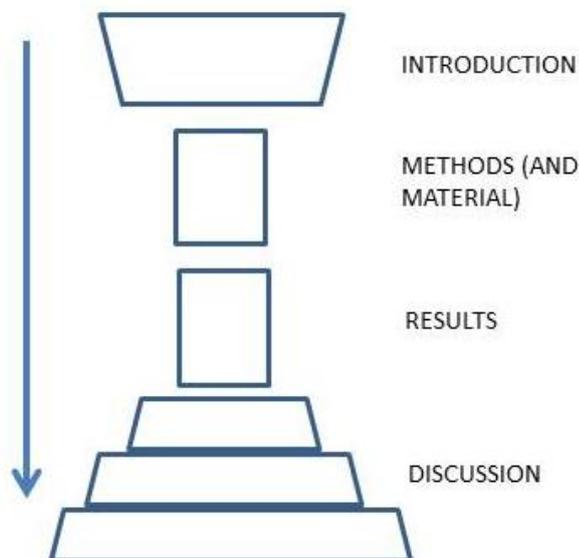
## 4. Structure and Style

The cover page is the first page and the title with additional details is presented here. Note the placement. The cover page is followed by the abstract, potential forewords, potential abbreviations and the list of content. The list of content covers all pages including the abstract and forewords. The main sections in the thesis are the introduction, literature review, research approach, empirical research, discussion and implications. The list of references is significant, too. The potential appendices come last.

Even if the structure generally follows the presented structure, the order of writing may vary. Very often the thesis is written in a mixed order and the sections are written one at a time. They also influence each other and therefore completion is needed.

### 4.1 Typical structure

The general structure of an academic thesis often follows the format (Fig. 3) presented by Swales and Feak (1996) in their guidelines for constructing a research paper. One could say that the content of the thesis proceeds from general to specific (Introduction) and back to general (Discussion).



**Figure 3.** General structure (Swales & Feak, 1996).

The four sections in Figure 3 have been developed over the last hundred years and they have different purposes in the thesis like they have in a research paper (see Swales & Feak, 1996). Therefore they are presented with different linguistic characters. Specifically, the thesis is written in detail enough that the reader may get a conception of the research and of what the findings are based on. The discussion returns the topic on a general level and places the research findings in relation to the prior research.

## 4.2 Abstract

The abstract is an independent section in the beginning of the thesis. It must be a concise whole that includes no referring to other sections of the thesis or to other material. The motivation, research methods, main observations and contributions are presented in the abstract, each with a few sentences. In other words, the abstract is the thesis in a miniature size. The abstract is written in past tense (because the study is already done at the moment of writing the abstract).

The length of the abstract is one page in maximum. After the abstract the keywords are listed. If appropriate, the keywords can be chosen from The ACM Computing Classification System<sup>3</sup> added with own keywords.

## 4.3 Foreword

The forewords are not compulsory. As explained earlier in this guideline, it is an established practice to thank those people and other stakeholders who have contributed the implementation of the thesis. The personal names are presented with ranks differing from the use of names in other parts of the thesis. (Hirsjärvi, Remes, & Sajavaara, 2004.) The writing style is usually more informal than in the other sections of the thesis.

## 4.4 Abbreviations

If needed, the abbreviations are given in the beginning of the thesis, between Foreword and Contents. It is not needed to explain commonly known abbreviations. If the list is longer than one page, it is placed at the end as an appendix. The abbreviations are written out both in the list of abbreviations and in the body text whenever they are used for the first time.

## 4.5 Introduction

Introduction is the first chapter of the Master's thesis. Below you can find a recommendation for the structure of the introduction. The recommendation is valid for a general scientific publication. The topics should be presented in the given order as in academic tradition the reader seeks the information generally in that order. If you write several paragraphs or even one paragraph with several sentences on the topic you may write a sub chapter of it. This is a question of style and you may discuss with your supervisor about it.

- Purpose (of the study)
- Motivation (importance, contribution for practice and theory)
- Prior research (what is known and what more should be known)
- Research question (research topic, focus of the thesis)
- Research methods (used in the study)
- Main contribution (derived from the thesis)
- Structure (of the thesis).

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<sup>3</sup> Available: <http://www.acm.org/class/1998/>

The purpose of the chapter is to provide the readers a general picture of the thesis. Based on the introduction the reader may decide whether she or he will read the thesis or not.

As the contents of the thesis may change also in the late phases of the process, the last paragraph of the introduction should be checked before the latest version is forwarded.

## 4.6 Prior research

This chapter is based on prior literature. The current study must not be mentioned at all as all text is based on earlier knowledge. Based on the references and writing style, the reader is to be aware of what the origin of the writing is and why it is included in the thesis. The responsibility of the author is to present the prior research so that the reader understands how the research topic is covered by other scientists. In addition, the author may emphasise the topics that have received only minor attention so far.

Because the prior research represents existing theory, it is written in present tense. With the help of linguistic means the author expresses time related matters and periods.

An important part of the prior research is the framework that is drawn based on prior research. In case the framework is built it is presented in this section of the thesis.

## 4.7 Research methods

The contents between the introduction and discussion are dependent on the research questions and research methods. However, in an academic thesis it is significant to rigorously utilise recognised research methods (remember references). Also, it is necessary to describe the research methods to show that the author has understood them.

As in any scientific research, the research problem is described to the audience. Also, the planned research methods are presented. More information about presenting research problems and research methods is available in several articles and handbooks (e.g. Borrego, Douglas, & Amelink, 2009; Klein & Myers, 1999; Järvinen, 2001; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007; Viljanen, 1986).

## 4.8 The study / Empirical research / Implementation

The actual study is described in this section. The structure of the chapter depends on the implementation. The study is described in past tense because the empirical research is done when the research is reported in the form of the thesis. If needed, the empirical context can be described in a sub-section of its own.

## 4.9 Findings

The research data and research analysis is reported before the implications of the study are presented. Based on this section, the reader may evaluate if the research is reliable and valid. Because the findings are collected from the current study made at the time, the chapter is written in past tense. Depending on the study it is also possible to include findings into the previous section (empirical study). Note that the titles of the chapters are kept sensible.

## 4.10 Discussion and implications

The second last section of the thesis consists of discussion where the current research is talked through based on prior literature. As this section reports earlier studies and current studies it is important to pay attention to the writing style and the use of past tense or present tense. The reader must always be aware of which is the case. The critics on the empirical study are presented and the study is evaluated objectively (see Klein & Myers, 1999).

This section includes a summary of the findings. The research questions are responded explicitly.

The topics in Discussion may include the following items presented separately:

- Theoretical implications
- Methodological and empirical considerations
- Managerial implications.

As the chapters may not end with tables, pictures or lists, there must be body text also after the list above.

## 4.11 Conclusions

The thesis ends with conclusive words that sum the thesis up. This section has similarities with the abstract but it is not as independent as the abstract is. In this section the following topics are covered:

- Research results and contributions
- Limitations of the study
- Recommendation for future research.

The limitations of the current study are presented to inform the audience that the evident lacks are recognised and some of them even planned. The recommendations for further research are based on the current research. The topics may root from limitations in the current study or new findings that deserve further studying.

## 4.12 References

The references are listed in alphabetical order. See the APA referencing guide to find out the exceptions that are valid when, for example, there are exceptionally many authors or no information about publication year or authors are visible.

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## Appendix A. Structure for the research plan

A research plan can be reported according to the next structure. Every section is adapted according to the plan.

### **Introduction**

The topic is introduced on general level. The context of the research is described and the research problem is explained and justified. The problem is situated in its larger environment. The researcher may reason the topic also by describing his or her personal motivation.

### **Research problem and research methods**

The problem under study is explained as explicitly as possible. The research problem can be divided into sub problems or presented as hypotheses. The research methods and analysis are described.

### **Limitations**

The planned limitations and shortcomings are named in the current research that is recognised so far. The reasons for them are explained from the viewpoint of the current research.

### **Preliminary earlier research**

The prior literature is presented briefly. Its relevance in the current research is described and limitations recognised in prior research are identified if possible.

### **List of main prior literature in relation to the background theory**

Main background references are listed. The main viewpoints of the chosen references may be presented, as well.

### **Timetable**

A plan to describe the planned research related to calendar time. It is recommended that the plan is discussed with supervisor to ensure enough milestones for checking thoroughly the status of the thesis.

### **Preliminary structure of contents**

A rough estimate of the structure for the thesis.

## Appendix B. The styles used in the document

Style	Font	Usage	Note
Title	Arial 20	The main title.	Bold
Subtitle	Arial 18	The sub title (if needed).	
AuthorInformation	Times New Roman 12	Author details on the cover sheet.	
Keywords	Arial 12, Italics	Title for keywords.	
Heading0	Arial 18	Title for foreword, abstract, contents, abbreviations, references and appendices.	No numbering
Heading1	Arial 18	Main chapter. Begins a new page.	
Heading2	Arial 14	Second level title.	
Heading3	Arial 14	Third level title.	
Heading4	Arial 12, Italics	Fourth level title.	No numbering, not recommended.
Normal	Times New Roman 12	Body text.	
Emphasized	Times New Roman 12, Italics	Emphasised text in Italics.	
FigureCaption	Arial 10	Title for picture.	
TableCaption	Arial 10	Title for table.	
TableHeader	Arial 10, Bold	Title cells in table.	
TableText	Times New Roman 10	Text cells in table.	
ListItem	Times New Roman 12	List item.	
ListItemLast	Times New Roman 12	Last item in a list.	
ListItemNumbered	Times New Roman 12	Numbered item in a list.	
CodeSample	Courier New 10	Example of code.	