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Date : DECEMBER 20, 2023

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Date : DECEMBER 20, 2023

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This is to confirm that this research has been conducted through a collaboration

_____ and _____.

Certified by:

Signature :

Name :

Position :

Official Stamp

Date

* This section is to be filled up for theses with industrial collaboration

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Tandatangan :

Nama :

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THE THESIS TITLE
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THE AUTHOR

A thesis submitted in fulfilment of the
requirements for the award of the degree of
Doctor of Philosophy

School Name
Faculty Name
Universiti Teknologi Malaysia

OCTOBER 2023

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I declare that this thesis entitled “*The Thesis Title Second Line (Optional) Third Line (Optional) Fourth Line (Optional)*” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : _____
Name : THE AUTHOR
Date : DECEMBER 20, 2023

ACKNOWLEDGEMENT

I dedicate this template to those who have spent countless hours to make this possible.

ABSTRACT

A 1-page abstract is a *movie (thesis) trailer*. Avoid summarizing your Introduction chapter. Focus on the problem statement, hypothesis/objective, research approach, quantitative validation summary, and implication of your findings. For Ph.D., emphasize on original contributions.

ABSTRAK

The Malay abstract is written as the sentence structure of the English abstract. All specific terms must be checked with Dewan Bahasa and Pustaka (<http://prpm.dbp.gov.my/>).

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LIST OF ABBREVIATIONS

PC	-	Personal Computer
UTM	-	Universiti Teknologi Malaysia
WWW	-	World Wide Web

LIST OF SYMBOLS

γ	-	Whatever
k_i	-	Whatever

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CHAPTER 1

INTRODUCTION

This template conforms with the Universiti Teknologi Malaysia 2023 new requirement [1]. Students who wish to learn more on LyX should refer to documentations available here [2]. You do not need to know deep on LaTeX [3] to use this LyX template.

1.1 Definition of thesis

A *Thesis* (generic term, see also Figure 1.1) is a documented evidence of defined scope and length that a candidate is

- Understand relevant theoretical issues
- Technically competent
- Has critical-thinking ability
- Able to *conduct scholarly research*

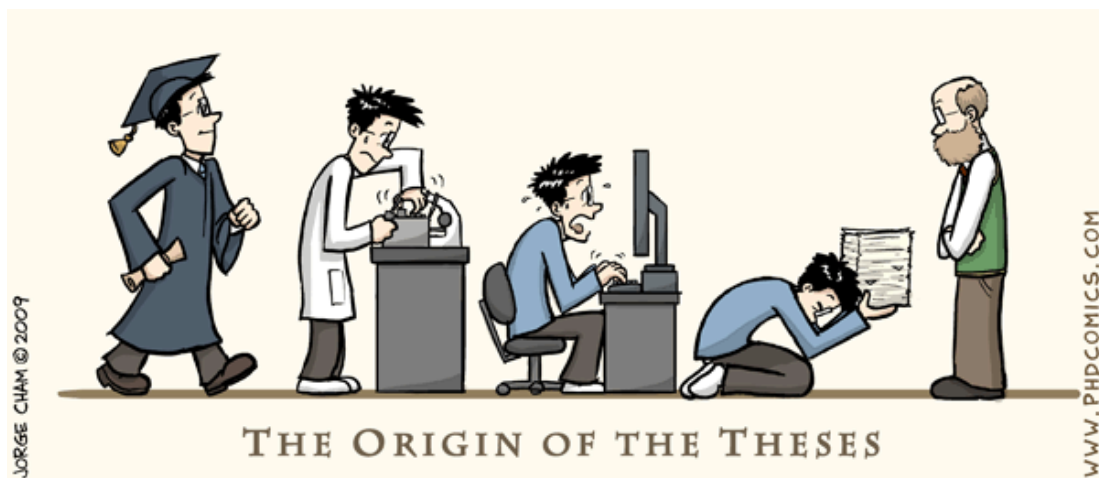


Figure 1.1 The origin of thesis.

Students have to write a scientific document of a defined scope and length to demonstrate the achievement. According to UTM nomenclature

- UG FYP - *report*
- Master by taughtcourse project - *project report*
- Master by taughtcourse and research (mixed-mode) - *dissertation*
- Master by research and PhD - *thesis*

Different degree level has different expectation

- Undergraduate report demonstrates the capacity to apply basic research skills in an area of interest. At this level, the focus is on gaining **broad competencies**.
- Masters thesis/dissertation/report demonstrates the capacity to apply advanced research skills (i.e. move **beyond basic** research skills) in an area of interest to a Master student is able to incorporate some critical insights in his/her study. At this level, the focus is on developing critical thinking in a subject area.
- PhD thesis demonstrates the capacity to apply **specialized** research skills (i.e. expert knowledge of a particular concept or method) in an area of interest so that a PhD student can make significant and original contribution to knowledge. At this level, the focus is on identifying a 'gap' in knowledge and addressing it, hence advancement in knowledge in a field of study.

CHAPTER 2

THESIS STRUCTURE

2.1 Flow of arguments

Each thesis is unique and depends on the writer and the editor (your supervisor). There is no cast-on-stone and rigid thesis structure. The following example a good starting point.

2.1.1 Thesis Title

Thesis title should be a concise description of the main focus and contribution of the research. It should show strength and specificity of the thesis work.

2.1.2 Abstract

- A short summary of the the thesis/dissertation/report
 - Describe the problem and the research approach
 - Emphasize the original contributions
 - A movie trailer and not a summary of thesis

2.1.3 Introducing your work

- An overview of the problem
 - Problem motivation and why it is important

- Problem definition highlight what had been done before and the research gap to be studied, worthy a (PhD, Master, or UG) degree
- Your hypothesis or objective of the thesis
- Organization of the thesis – you should guide the readers on what to expect next
- Make it readable by anyone

2.1.4 Discussion of the problem and state-of-the-art solutions to problem

- Usually titled as Literature Review
- Not a literature survey in general, but rather a synthesis of the state-of-the-art related to the thesis!
 - Can also include a background information – brief synthesis of the most relevant aspects related to the thesis in order to help the reader understand the context and the contributions coming from other disciplines.
 - It can also be used to better motivate the research question.
 - Identify gaps/limitations of existing state-of-the-arts
 - Background & related work may overlap
 - * Need to discuss related work at start to set the scene
 - * Need to discuss related work at end to demonstrate your originality
 - * But not cut and paste!
 - * Exercise your synthesis and critic skills!
 - Make the definitions precise, concise, and unambiguous.

2.1.5 Your proposed work

- Usually entitled Methodology, but not necessary
- Here you develop your conceptual contribution, i.e. the central concept of your work
 - Discussion of the thesis and different perspectives of analysis of the research question
 - * Definition of problem
 - * Formulation of concepts, definitions, theories
 - Research design
 - * Elaboration of frameworks, models, architectures
 - * Methods and procedure, variables
 - * May include description of a prototype system implementation and its use towards solving the research problem
 - * Can include some context information (e.g. development software, test environment, procedure, limitations, assumptions, range of validity)
 - * But not too many details!!!

2.1.6 Validation of hypothesis

- Usually titled as Result and Discussion
- Describe experiment details that provide evidence in support of your thesis
 - Developing a prototype may not enough to validate the thesis – at most it is a proof of feasibility of your system
 - Validation is about collecting (enough) evidence to convince the other researchers about the validity of the thesis through
 - * A proper (systematic) method
 - * Organized argumentation (is important)

- Analysis and concepts form the heart of the work
- It must state what was learned, not only the facts that were gathered!

2.1.7 Take home message to readers

- Summarize what was learned and how it can be applied
 - Include the broader implications of your results
 - Do not repeat word for word the abstract, introduction or discussion
 - Mention the possibilities for future research

2.1.8 References to back up your statements

- If you make a statement, back it up with your own data or a reference
 - All references cited in the text must be listed
 - UTM supports either the numbering or author-year format
 - Try to avoid inclusion of references as footnotes

2.1.9 Appendices

- This is an optional part
 - It can include:
 - * Implementation details
 - * Detailed experiment data
 - May be important to
 - * Convince the reader
 - * Help others replicating the experiment

- ... but are “boring” or too detailed to include in the main body of the thesis

2.2 Suggested order for writing

- Begin by writing the chapters that describe your research (2,3, 4, and 5 in the above outline)
- Define all technical terms and make the definitions precise and formal
- After reading the main chapters to verify terminology, write the conclusions
- Write the introduction
- Complete with an abstract

2.3 The revision journey

- Revise them and start getting feedback
 - **think-plan-write-revise** cycles
- Get early feedback from colleagues
 - Starting with the key chapters
- Carefully revise those chapters before giving them to your supervisor
- When you have a complete draft
 - Consider 2 or 3 complete revision/editing iterations!
 - Could be more

CHAPTER 3

RESULTS AND DISCUSSION

3.1 Equations

Use AMS packages when necessary. Here is an example of an equation array.

$$\begin{aligned} A &= B, \\ &= D, \end{aligned} \tag{3.1}$$

$$E = F \tag{3.2}$$

3.2 Graphic and Images

A good thesis needs good diagrams/graphs/illustrations. Spend some time doing in properly. A good picture tells a thousand words.

3.3 Floats

- A float doesn't have a fixed location.
 - It can “float” forward or backward to wherever it fits best to get a high quality layout.
 - Caption as part of a float.
- Float Placement
 - h : try to place the float at the position where it is inserted
 - t : try to place the float at the top of the current page
 - b : try to place the float at the bottom of the current page
 - p : try to place the float at an own page



Figure 3.1 Example of a figure. This is a long, very long, long long, long caption. You can give a shorter caption for the “list of figures” using the square bracket symbol.

Table 3.1 The role of statistical quality engineering tools and methodologies

Temperature	Resonant Frequency	Q factor
13 mK \pm 1 mK	16.93	811
40 mK \pm 1 mK	16.93	817
100 mK \pm 1 mK	16.93	815
300 mK \pm 1 mK	16.93	806
500 mK \pm 1 mK	16.93	811
800 mK \pm 5 mK	16.93	814
1000 mK \pm 5 mK	16.93	806

Table 3.2 The role of statistical quality engineering tools and methodologies

Temperature	Resonant Frequency	Q factor
13 mK \pm 1 mK	16.93	811
40 mK \pm 1 mK	16.93	817
100 mK \pm 1 mK	16.93	815
300 mK \pm 1 mK	16.93	806
500 mK \pm 1 mK	16.93	811
800 mK \pm 5 mK	16.93	814
1000 mK \pm 5 mK	16.93	806

Table 3.3 Feasible triples for highly variable Grid, MLMMH. Can include some context information (e.g. development software, test environment, procedure, limitations, assumptions, range of validity)

Time (s)	Triple chosen	Other feasible triples
0	(1, 11, 13725)	(1, 12, 10980), (1, 13, 8235), (2, 2, 0), (3, 1, 0)
2745	(1, 12, 10980)	(1, 13, 8235), (2, 2, 0), (2, 3, 0), (3, 1, 0)
5490	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
8235	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
10980	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
13725	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
16470	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
19215	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
21960	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
24705	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
27450	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
30195	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
32940	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
35685	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
38430	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
41175	(1, 12, 13725)	(1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
43920	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
46665	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
49410	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
52155	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
54900	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
57645	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
60390	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
63135	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
65880	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
68625	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
71370	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
74115	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)

Continued on next page

Table 3.3 – continued from previous page

Time (s)	Triple chosen	Other feasible triples
76860	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
79605	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
82350	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
85095	(1, 12, 13725)	(1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
87840	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
90585	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
93330	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
96075	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
98820	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
101565	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
104310	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
107055	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
109800	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
112545	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
115290	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
118035	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
120780	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
123525	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)

CHAPTER 4

CONCLUSION

That's all folks. Please read further on how to use the template. It is not a silver bullet.

4.1 Research Outcomes

4.2 Contributions to Knowledge

4.3 Future Works

REFERENCES

1. Universiti Teknologi Malaysia Thesis Guideline, 2023. URL <https://sps.utm.my/>.
2. LyX, 2013. URL <http://www.lyx.org>.
3. LaTeX Wikibook, 2013. URL <http://en.wikibooks.org/wiki/LaTeX>.

Appendix A Time-series Data

Some data

LIST OF PUBLICATIONS

Journal Articles

- (a) Paper 1
- (b) Paper 2

Conference proceedings

- (a) Paper 3
- (b) Paper 4