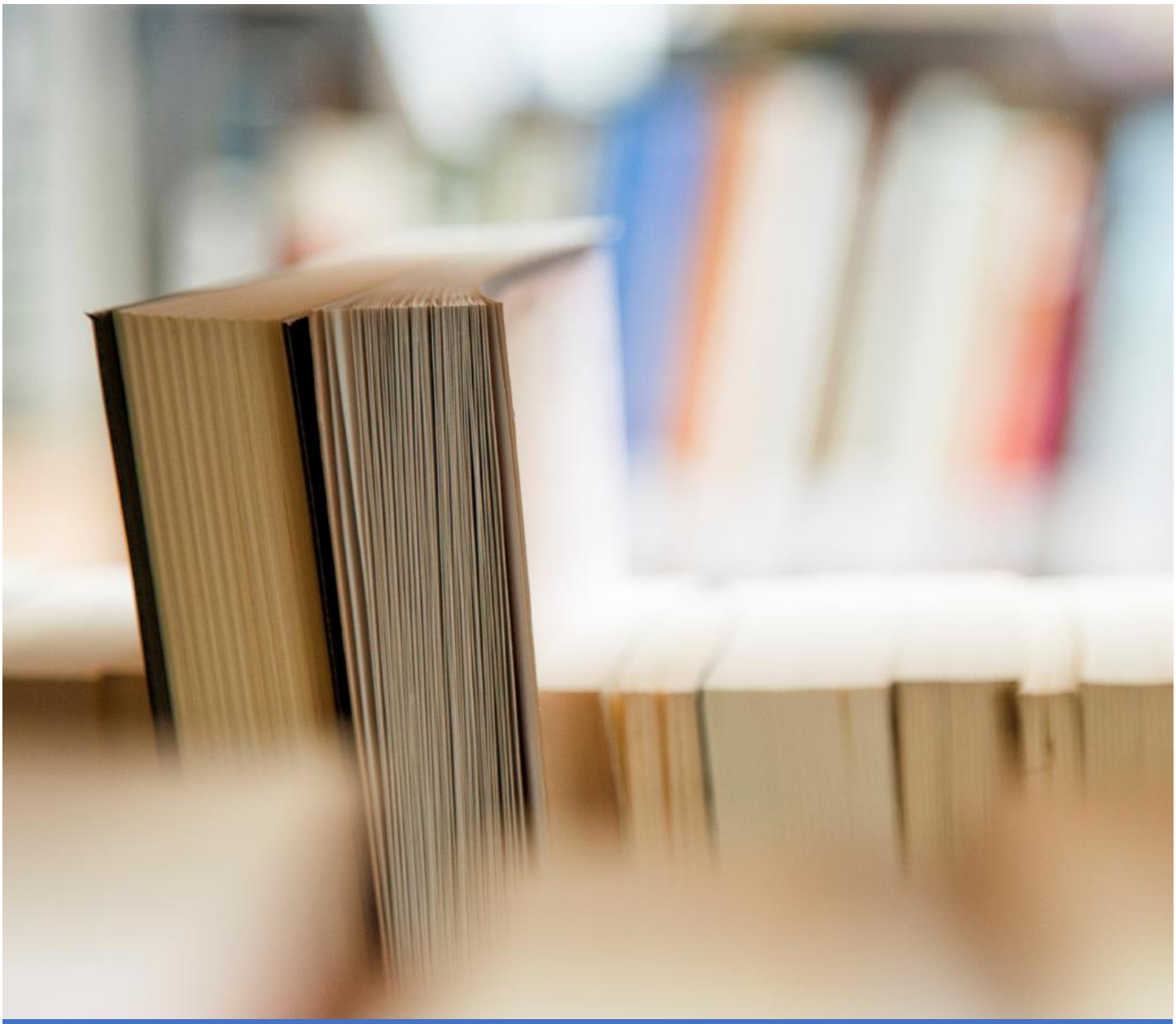
UNIVERSITI MALAYSIA PERLIS



GUIDELINES FOR PREPARATION AND SUBMISSION OF GRADUATE THESIS

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CHAPTER 1 : INTRODUCTION

1.1 Overview

This guide is designed to help graduate students in their preparation and submission of thesis. It deals with the submission format and physical format of the thesis. This guide also gives suggestions on the type of content of several sections commonly present in most theses. It is the responsibility of each student to ensure that his or her thesis conforms to the Guideline set out below. Failure to do so will result in the rejection of thesis during submission for examination. Further information or clarification of the guideline can be obtained from the Centre for Graduate Studies.

CHAPTER 2 : THESIS SUBMISSION

The subject of the thesis must have the prior approval of the student's Supervisor(s) and school. Candidate intending to submit their thesis should comply with the following procedures:

2.1 Pre-Submission

a) Candidates should notify the Centre for Graduate Studies at least **three (3)** months before they intend to submit a thesis. Notification can be done by filling in PIT-12 form available at the CGS website:www.cgs.unimap.edu.my.

b) In the case this submission is delayed for more that **six (6)** months than the envisaged date, the candidate is required to resubmit the notice of submission using the prescribed form.

2.2 Submission

a) A thesis can only be submitted for evaluation during the period of candidature. Hence, it is the responsibility of the student to ensure that his or her status is as active at ALL TIMES prior to the submission of thesis for evaluation.

b) Following the completion of the approved program of study and research, a candidate must submit **eight (8)** ring bound copies of the thesis to the Centre for Graduate Studies.

c) It is advisable that candidates present one draft copy of the thesis to the Centre for Graduate Studies just before submitting the **eight (8)** copies, to ensure that

a final verification is conducted on the format before the thesis is submitted for examination.

d) Submission of the theses should be attached with thesis submission form which is available from the office or from the website.

2.3 Post-Submission

a) A candidate must be ready for a *viva-voce* session by at least **six (6)** weeks for **Master students** and **ten (10)** weeks for **PhD students** from the date of submission of thesis for evaluation.

b) A candidate must, after the successful defense of his or her thesis, submit to the Centre for Graduate Studies **three (3)** hard bound copies of the approved thesis (*corrected, verified and approved, by the person and within the maximum duration, as agreed upon during the viva-voce session by the Thesis Examination Board*).

c) The candidate is also required to submit **one (1)** CD containing ALL materials (thesis, presentations, images, data, etc.) pertaining to the conducted study and research. These materials must be arranged properly in separate folders.

d) Submission of these items should be accompanied with the final thesis submission form and the form to confirm the verification of the final version of thesis which are available from the office or from the website.

e) The University shall not confer the degree to a candidate unless and until these requirements have been met.

2.4 Re-Submission

a) A candidate whose thesis is required to be resubmitted must ensure they do so within the stipulated period as decided by the Panel of Thesis Examiners.

b) A thesis, which is resubmitted for evaluation, will be treated as a fresh copy and will be subjected once again to the same procedures of thesis submission for examination.

c) The flowchart for the thesis submission process is given in **Appendix A**.

CHAPTER 3 : THESIS PREPARATION

3.1 Format of the Thesis

3.1.1 Language

The language used in the thesis should be English. However, students who wish to prepare their thesis in Bahasa Melayu can do so by getting a written approval from the Dean of the Centre for Graduate Studies. The language of the thesis should be direct and simple, as the subject matter will allow. Several standard guides to acceptable grammar are available from the Centre for Graduate Studies.

3.1.2 Font

Candidates must use 12 point **Times New Roman** font when preparing their thesis. No other fonts are acceptable.

3.1.3 Spacing

a) Double spacing for general text throughout the thesis.

b) Single-spacing for explanatory footnotes, long quotations, appendices, long headings or subheadings and captions of tables and figures.

3.1.4 Typing

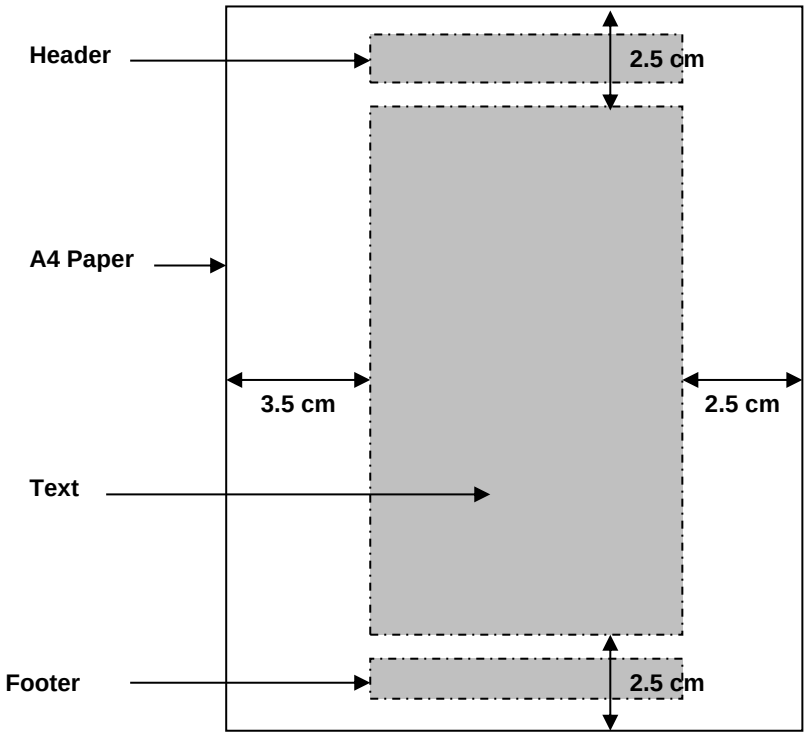
a) The thesis must be typed on one side of the page.

b) It is advisable that candidates submit laser-jet printed copies of their thesis. For ink-jet copies, printers with high quality black ink should be used. Computer papers or carbon copies are NOT acceptable.

c) The use of color in a thesis is not compulsory. However, it is advisable to color print (laser or ink) any image or portion of the thesis if it helps in understanding or interpretation of the subject matter.

3.1.5 Margins

a) The top and bottom margins of all pages must be 2.5 cm wide. The right-hand margin must be 2.5 cm wide and the left-hand margin must be 3.5 cm wide.



b) All printed materials (text, tables, figures, etc.) must appear inside the text area defined by the margins.

c) The space defined by the footer and header margins must only be used for page numbering and footnotes.

d) Footnotes must be at a minimum, single-spaced and in normal 8-point font.

3.1.6 Paragraphs

a) Any paragraph must have at least **two (2)** full lines in a page. Otherwise begin on the next page.

b) Paragraphs must be indented with not more than **one (1)** *tab-key* spacing.

c) An empty line of double spacing width is required between paragraphs and headings, between paragraphs and captions and between paragraphs and floats. NO double spacing is required between paragraphs.

d) Paragraphs must be aligned as *justified*.

3.1.7 Pagination

a) Pages must be numbered consecutively throughout the thesis, including pages of figures, tables and appendices.

b) Pages numbers must be centered at the bottom of the page.

c) Page numbers must be in normal font without punctuation. They should NOT be in *italic* or **bold** font. They must also appear by themselves and are not to be enclosed in parentheses, hyphens or any other decorative fonts.

d) Preliminary pages (those preceding Chapter 1) must carry pages numbers in roman numerals (i, ii, iii, etc.).

e) The title page (front cover) must **NOT** be numbered though it is counted as a page of the preliminary part of a thesis.

f) Arabic pagination (1, 2, 3, etc.) begins with the first page in Chapter 1 (or the introduction). Numbering must restart for Arabic pagination.

g) Page number must be printed at least 1.25 cm from the bottom margin of the page (in the footer section).

3.1.8 Appendices

a) Each appendix must be identified separately using an alphabet (A, B, C, etc.).

b) The pages of the appendices must be continuously numbered, from the main part of the thesis, according to the above pagination system using Arabic pagination.

c) All pages in the appendices including those with diagrams, tables, images, etc. must have a page number.

3.1.9 Color, Quality & Size of paper

a) Only white color paper must be used.

b) Paper of not less than 80g must be used for printing

c) Paper of A4 size (210 mm × 297 mm) must be used for all submitted copies of the thesis.

d) If paper of larger size is used (for schematics, drawings, etc.), they must be folded into A4 size.

3.1.10 Duplication

a) Photocopies of theses are accepted for the purpose of examination only.

b) It is the responsibility of the student to ensure that all photocopied theses submitted for examination are of proper alignment and clarity.

c) However, all final submitted copies of theses after the defense MUST be printed. Photocopies are NOT acceptable.

3.1.11 Symbols or Characters

a) The existing symbols within most word processors should be used to insert a symbol or character. Do not attempt to convert normal font to italic for symbols. **For example, Italic – *A* and Symbols – 𝙰 are not the same**.

b) It is advisable that candidates avoid using uncommon symbols or characters.

3.1.12 Floats

a) Floats in a thesis document refer to any portion of the thesis that does not resemble any form of normal text. They *float* in the midst of all the text present in a thesis document.

b) Formulas, data, images, drawings, algorithms, flowcharts, schematics and program codes are all example of floats.

c) There are ONLY **three (3)** categories of floats; formulas must be stated as equations, data must be presented in tables and everything else must be inserted as figures.

d) ALL floats in a thesis document MUST have a caption. Tables and figures MUST be referenced or cited within the text.

e) Device captured images that are inserted into a thesis document must be ensured of proper quality and clarity. Mechanical or hand drawn sketches must be scanned and inserted. Electronically obtained images must be ensured of proper resolution before insertion into the thesis document. All figures must be centered.

f) For equations, it is advisable to use the existing Equation Editor within the word processor, even for simple ones. All equations must be **left justified** and must NOT end with punctuation.

g) Tables must be centered and constructed with horizontal and vertical lines only. Candidates are not advised to use oblique lines. Text entry into tables must use suitable font, size and alignment.

h) Candidates are advised to place floats close to the portion of the thesis citing the float.

i) For all other type of floats, the candidate is requested to refer to the Centre for Graduate Studies for proper guide on presentation.

j) Examples of floats can be found in **Appendix B**.

3.1.13 Captions

a) The caption for various floats in a thesis document MUST be formatted using the guidelines presented in the following table.

ITEM	CAPTION LOCATION	TYPESETTING	EXAMPLE
Figure	Centered, Bottom	Figure Chapter.Number:	Figure 2.1:
Table	Centered, Top	Table Chapter.Number:	Table 4.4:
Equation	Extreme Right	(Chapter.Number)	(5.3)

b) Double spacing is used between floats and paragraphs.

c) Normal font is used in all captions.

d) Equations that span over more than two lines should not have captions for each line. Instead a single caption should be placed at the extreme right at the last line of the equation, even if it appears on another page.

e) An example on captions can be found in **Appendix B**.

3.1.14 Citation

a) If the following items are referenced, the following guidelines must be used.

ITEM	KEY	TYPESETTING	EXAMPLE
Figure	Chapter.Number	Figure Chapter.Number	Figure 2.1
Table	Chapter.Number	Table Chapter.Number	Table 4.4
Equation	Chapter.Number	Equation (Chapter.Number)	Equation (5.3)
Heading	Number.Section.Subsection	Heading Number.Section.Subsection	Chapter 4, Section 4.5.3
Reference	APA Style	(Author, Year)	(Thomas, et. al., 2006)
	IEEE	[Number]	[1]

b) Normal font is used in all citations.

c) The first alphabet in a citation is always in capital letters.

d) An example of citations can be found in **Appendix C**.

3.1.15 Itemizing

a) Items must be put in a list and bullet or alphanumeric itemized.

b) The sentence preceding a list must end with punctuation, or **:** only.

3.1.16 Subdivisions

a) Candidates are advised to subdivide their thesis into **four (4)** parts;

i) Preliminaries,

ii) Main Text,

iii) References, and

iv) Appendices.

b) Suggested formatting of these parts is given in the next section.

c) For the main text, headings and sub-headings must be numbered appropriately.

d) Chapters must be numbered without any decimals and capitalized.

e) Sections within chapters must be numbered according to the format Chapter.Section.Subsection with a decimal indicating the depth level.

f) A depth level of not more than **three (3)** is recommended (2 decimals).

g) No change in font type or size should appear in the headings. However, headings must be in **bold**.

3.1.17 Length of Thesis

a) Generally, PhD and Masters theses should NOT exceed 80,000 and 50,000 words respectively.

b) Candidates are advised not to lengthen their thesis with unnecessary, irrelevant or protected data, figures, datasheets, program codes, etc. in their appendices.

3.1.18 Binding

a) Following acceptance and approval (*corrected and verified after the defense*) of the thesis for publication, three **(3)** hard cover bound copies of the thesis shall be submitted to the Centre for Graduate Studies.

b) The outside thesis hard cover shall be printed according to the program color-coding. For the Master program, the hard cover must be in **Blue (UniMAP)** and for the PhD program, the hard cover should be in **Black**.

c) The title of the thesis, name of candidate and the degree for which the thesis is submitted must be printed in Gold and CAPITALIZED on the front thesis hard cover using 18 point Times New Roman **(Appendix D)**.

d) The title of the thesis must be in bold.

e) These particulars should also be printed on the spine of the bound thesis using 10 point Times New Roman with the name of the candidate in bold (written from the head to the foot of the spine) if the thesis is thick enough **(Appendix E)**.

f) Nothing must appear on the back thesis hard cover.

3.2 Sections in a Thesis

All theses should be divided into appropriate sections, chapters or divisions. Candidates should bear in mind that thesis examiners deplore overlong or verbose thesis, and the responsibility is on the candidate to provide a well-organized and well-written thesis.

Every candidate should remember that generally a thesis consists of 4 parts; *Preliminaries*, *Main Text*, *References* and *Appendices*. The sections of a thesis are contained within these 4 parts. The following ordered list of thesis sections is supposed to serve only as a guide. Not all theses will include all sections listed below. Many of these sections are self-explanatory. Further information on some of the sections is provided following the list.

3.2.1 Title Page

The thesis title should be as concise as possible and should provide an accurate description of the thesis. The title must not exceed 15 words. The format of the title page is shown in **Appendix F** and must be followed closely.

3.2.2 Declaration of Thesis

Declaration of Thesis should be placed in the first page of every copy of the thesis. The Declaration of Thesis form is attached in **Appendix G**.

3.2.3 Permission to Use

Candidates are expected to include in the front of their thesis, a statement in paragraph form granting permission to use the thesis under specifically stated conditions and indicating the address of the person to whom request for such permission should be sent. The example of statement is attached in **Appendix O**.

3.2.4 Copyright

a) Under International Law the use of copyright material requires the permission of either the author or the publisher. It is the responsibility of the candidate to address this issue and cover any expenses incurred.

b) If a letter of authority or permission to use copyright material had been obtained, it can be included after the declaration of thesis.

3.2.5 Acknowledgements

This is optional, although most theses include a brief statement of thanks in recognition of special assistance and guidance given by individuals, institutions or government bodies.

3.2.6 Table of Contents

a) The title of chapters, sections and their principal subdivisions along with the page numbers on which they appear must be listed in the Table of Contents. Titles must be worded exactly as they appear in the text of the thesis.

b) Thesis with many subdivisions must use a hierarchical numbering system for headings and sub-headings. Such a numbering system combined with the judicious use of upper and lower case letters, indentations and italics or bold fonts should provide a summary of the relationships between the sections of the thesis. An example of this page can be found in **Appendix H**.

3.2.7 List of Floats

a) These lists consist of the exact captions of all tables and figures that appear in the thesis. All floats must be numbered consecutively throughout the text according to the chapters.

b) Captions must include numbering and the pages on which they appear.

c) Captions appearing on the list should be accurate, brief and easy to interpret.

d) An example of this is given in **Appendix I**.

3.2.8 List of Nomenclature

a) These lists consist of the exact definitions of all abbreviations, symbols and characters that appear in the thesis.

b) This list is optional, depending on the subject of the thesis. All scientific symbols must be presented with units that follow the standard SI system.

c) Definitions appearing on the list should be accurate, brief and easy to interpret (properly selected according to the norm).

d) An example of this is given in **Appendix I**.

3.2.9 Abstract

a) An abstract in **both** Bahasa Melayu and English is required.

b) The English version must have the title written in English and vice versa for an abstract written in Bahasa Melayu.

c) The abstract is a summary of the entire thesis. It should briefly outline the research problems addressed by the thesis, the findings and the significance of the work in the context of the field of study.

d) Both abstracts must not exceed one typewritten single spaced page of text (c. 400 – 500 words) written with normal font size of 12 points.

e) The abstract must be placed before the first chapter and the Bahasa Melayu abstract must appear first.

f) In writing an abstract, you should first complete writing your thesis. While the abstract appears at the beginning of your thesis, it should be the last section that you write. Once you have completed the final draft of your thesis, use it as a guide for writing your abstract.

g) The abstract must also be written in one paragraph. In order to succinctly describe your entire thesis, you will need to determine which elements are the most important. Structure the abstract in the same order as your thesis. Begin with a brief summary of the introduction and then continue on with a summary of the methodology, results and finally a summary of your findings in your thesis. While you should aim for brevity, be careful not to make your abstract too short. Try to write one to two sentences summarizing each section of your thesis. Once you have a rough draft, you can start to edit for length and clarity.

h) A sample abstract page is given in **Appendix J**.

3.2.10 Main Text

The main body of the thesis is usually arranged into consecutively numbered chapters or sections. The internal organization of the thesis is the responsibility of the candidate in consultation with his/her thesis supervisor(s). The organization will partly

depend on the field of study, but the responsibility is on the student to provide a systematic and well-organized thesis. Overall, the font of the main text must be 12 points with double-spacing.

A thesis will often include the following chapters:

Introduction

This should highlight the objectives of the study, problem statement, set forth a hypothesis, and outline the strategy adopted by the work.

Literature Review

All reviews from the previous findings related to the research are discussed in searching for the relevance and significance.

Research Methodology

a) All relevant experimental, descriptive, theoretical and analytical techniques used in the research should be outlined, such that another researcher could repeat the study.

b) Reference of methods to other research should be made where appropriate.

Results & Discussion

This section includes the analysis and presentation of data. The results should be interpreted and summarized.

Conclusion

a) Provides the context in which to interpret the results of the study, stressing the significance, implications and limitations of the findings.

c) The section should relate to the initially set out objectives spelled out in the beginning of the thesis.

d) A sample first page of a chapter indicating the typesetting of title and numbering of subdivisions is given in **Appendix K**.

3.2.11 References

Any thesis that makes use of other works, either in direct quotation or by reference, must contain a listing of all the sources. Only works directly cited or quoted in the text must appear in the references. Any reference that appears in the text of your thesis must be listed on the references page, and any item appearing on your reference page must be cited somewhere in the body of your text.

Format

a) The references may be presented according to the standard citation format that has been decided by the Centre for Graduate Studies and it must be used consistently throughout the thesis.

b) Candidates are required to follow the publication manual of the American Psychological Association's (APA) or IEEE as given in **Appendix L**.

Title

The title **REFERENCES** must be centralized in capital letters.

Font

The list of references must be written in font size 12 points. Candidates should take note that APA style requires certain fields within a reference to be *italic* or **bold** (see appendix).

Style

a) All entries must be in alphabetical order. The first line of a reference must be flushed with the left margin.

c) Each additional line must be indented once (usually accomplished by using the TAB key).

d) Do not press the space bar twice after a period or other punctuation. APA style requires only one space after any form of punctuation.

e) Each reference must be single spaced, but be sure to use double space between references.

f) A sample first page of this section indicating the typesetting of various types of references is given in **Appendix L**

3.2.12 Appendices

This section is optional and will depend on the individual thesis content. It contains supplementary illustrative material, original data and quotations, too long for inclusion and not immediately essential to an understanding of the subject.

Format

a) This section must be divided into sections as Appendix A, B, C, etc.

b) Any floats included in the appendices should be numbered and captioned as for all floats appearing in the main text (e.g. Figure A.1, Table C.4, etc).

Content

a) Candidates are required to discuss with their supervisors to decide on the appropriateness of the material that is included in the appendices.

c) Candidates should all together **AVOID** inclusion of materials for the sole purpose to lengthen their thesis.

d) Some of the material that appears in the appendices are as follows:

i) Data Sheets (vital electronic components),

ii) Image Database (sample),

iii) Training/Learning/Experimental Data (specific),

iv) Output Data (to show change),

v) Relevant Derivations and Proof of Formulas,

vi) Relevant Theorems, definitions or Lemmas,

vii) Computer Code (specific implementation),

viii) Flowcharts,

ix) Circuit Schematics (with list of components),

x) Information Listing,

xi) List of Publications (abstracts may be included),

xii) List of Awards (exhibition, competition, etc.), and any other relevant material deemed necessary.

e) A sample first page of this section indicating the typesetting of appendix title is given in **Appendix M**.

CHAPTER 4 : FINAL REMARKS

Writing a thesis is not an easy task, but if you do not take the first step, you will never see the end. This guide is intended to make sure that you take the first step in the right direction. In doing so, it is our intention that the task of writing your thesis will be memorable and pleasurable. Do not forget that your thesis is your personal work. It is *like* the first textbook that you will author. So take some time in presenting your ideas and findings in the best possible language, format, typesetting and layout (of course, according to the stipulated guidelines).

Before we end, some final piece of advice…

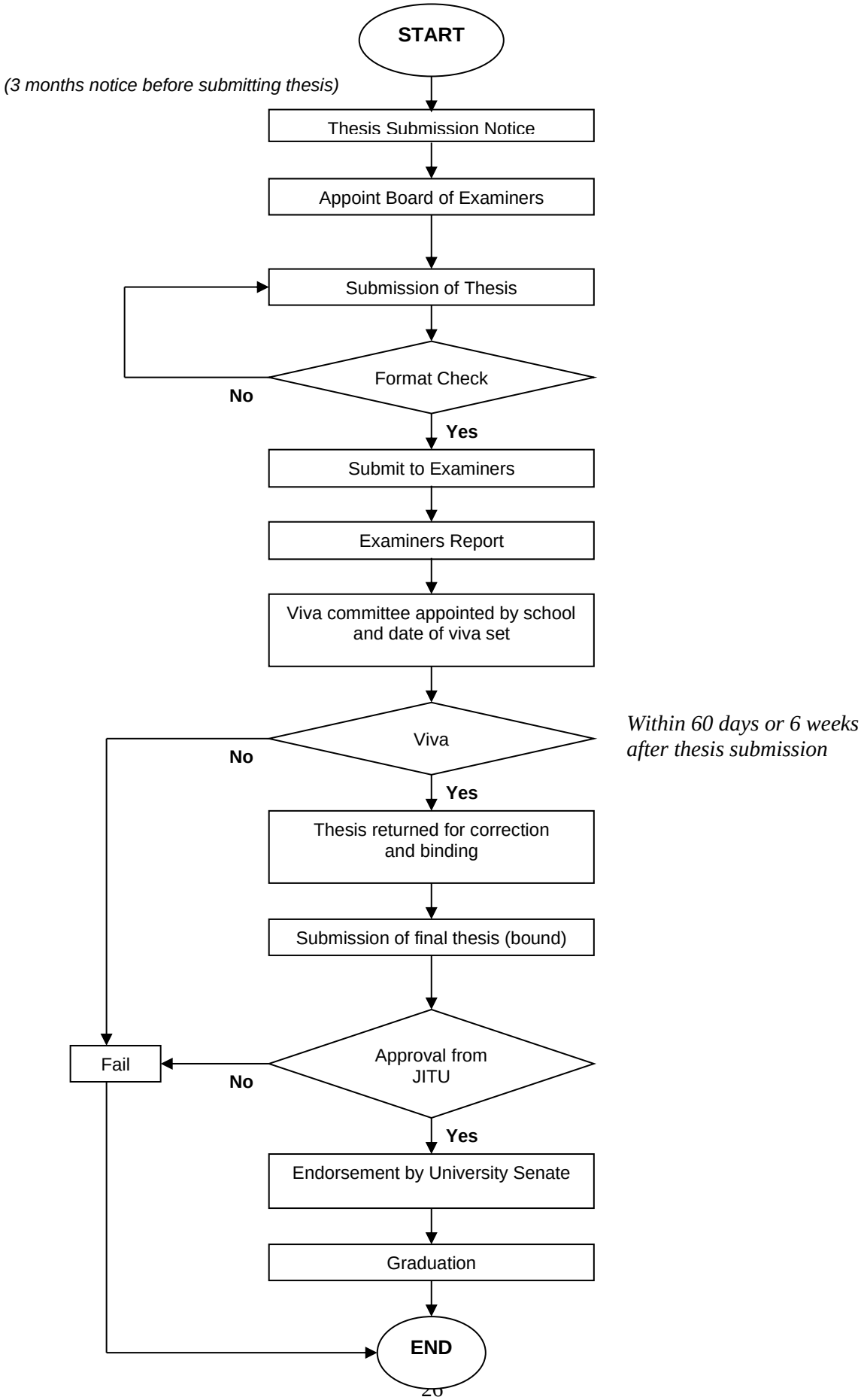
- Do not wait for the last minute to start writing. Start early.
- Start with the chapters you are most familiar with first.
- Save your document frequently.
- Avoid plagiarism!
- Seek assistance for language and translation.
- Stick to the necessities (a thesis is not a textbook).
- Give deadlines to yourself for each thesis section.
- Consult your supervisor frequently (send them what you have written and ask for corrections).

All the best !

Editorial Team (4th Edition),
Centre for Graduate Studies,
UniMAP – April 2021.
Wan Zuki Azman Wan Muhamad

APPENDIX A

FLOW CHART OF THESIS SUBMISSION



APPENDIX B

EXAMPLE & CAPTIONS FOR FLOATS

Figure

Figure 2.1 Seeback turtle found at the coast of Terengganu.

Table

Table 5.2 The color codes and connectivity of a 4-phase bipolar 8-wire stepper motor.

Motor Wire Color	Red	Red White	Black White	Black	Yellow	Yellow Green	Green White	Green
Coil Output Node	A	B	C	D	E	F	G	H
Serial Connection	A	Connected		A’	B	Connected		B’

Equation

$$\sum_{i=n}^{N} \mathrm{A}_i = \vartheta \tag{3.2}$$

APPENDIX C

CITATION OF REFERENCES & PARAGRAPH USING APA

(take note of citation to headings, references, figures, tables and also the usage of abbreviations, symbols, values and their units)

In Chapter 2, the design characteristics of the CLMP was finalized. According to Nagatani et al. (2000), because of the high estimated load of the CLMP, the driver circuit (L298) will consume high currents. To ensure the proper operation of this component, a heat sink is required. An additional aluminum plate, as designed in Section 2.6, is suggested to be attached to the L298 to function as a heat sink. A rough estimate on the dimensions of the heat sink can be obtained by using the following equation (David & Rosenberg, 2006; Nagatani et al. 2000),

$$A = h\left(\frac{T_{\max} - T_{amb}}{P_{tot}} - R_{jc}\right)^{-1} \tag{3.3}$$

where P_{tot} is the maximum rated power which is equal to 25W, T_{amb} is the ambient temperature which is equal to 30°C, T_{max} is the maximum rated temperature which is equal to 150°C, R_{jc} is the junction-case thermal resistance which is equal to $3°CW^{-1}$, h is the heat transfer coefficient which is equal to $537Wm^{-2}°C^{-1}$ and A is the suggested area of the heat sink. Based on these values and by using Equation (3.3), the area of the heat sink was found to be $0.001035m^2$. Since the height of the L298 chip is 2.3cm, the length of the heat sink can be calculated to be 4.5cm. Figure 3.14 shows the close-up view of designed heat sink and Table 3.2 gives the finalized dimensions of the heat sink.

APPENDIX C

CITATION OF REFERENCES & PARAGRAPH USING IEEE

(take note of citation to headings, references, figures, tables and also the usage of abbreviations, symbols, values and their units)

In Chapter 2, the design characteristics of the CLMP was finalized. According to Nagatani *et al.* [1], because of the high estimated load of the CLMP, the driver circuit (L298) will consume high currents. To ensure the proper operation of this component, a heat sink is required [2]-[3]. An additional aluminum plate, as designed in Section 2.6, is suggested to be attached to the L298 to function as a heat sink. A rough estimate on the dimensions of the heat sink can be obtained by using the following equation [2],[4].

$$A = h\left(\frac{T_{\max} - T_{amb}}{P_{tot}} - R_{jc}\right)^{-1} \tag{3.3}$$

where P_{tot} is the maximum rated power which is equal to 25W, T_{amb} is the ambient temperature which is equal to 30°C, T_{max} is the maximum rated temperature which is equal to 150°C, R_{jc} is the junction-case thermal resistance which is equal to $3°CW^{-1}$, h is the heat transfer coefficient which is equal to $537Wm^{-2}°C^{-1}$ and A is the suggested area of the heat sink. Based on these values and by using Equation (3.3), the area of the heat sink was found to be $0.001035m^2$. Since the height of the L298 chip is 2.3cm, the length of the heat sink can be calculated to be 4.5cm. Figure 3.14 shows the close-up view of designed heat sink and Table 3.2 gives the finalized dimensions of the heat sink.

APPENDIX D

BINDING COVER
(boarder included only for illustration purposes)

FULL TITLE (Max 15 words)

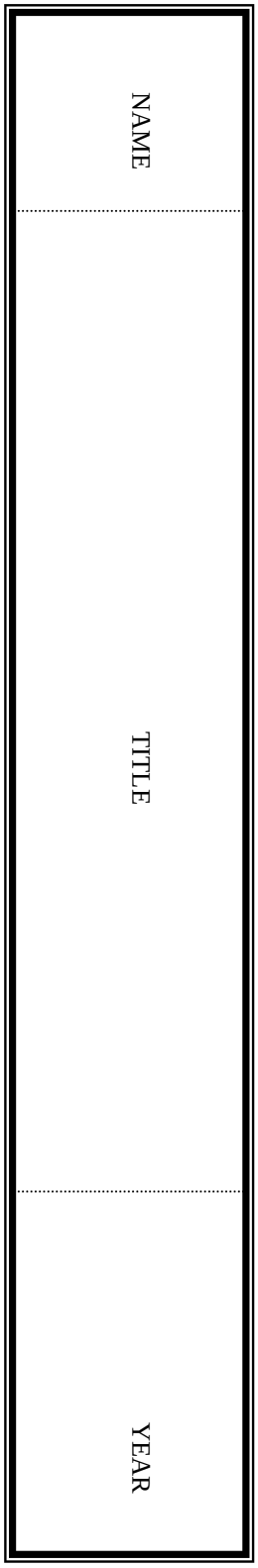
FULL NAME

UNIVERSITI MALAYSIA PERLIS
YEAR

FONT – Normal, centralized, Gold, BLOCK LETTERS, 18-point size Times New Roman

APPENDIX E

BINDING SPINE
(boarder included only for illustration purposes)



FONT – Normal, centralized, Gold, BLOCK LETTERS, Times New Roman.
(Font size adjusted according to thickness of spine for clarity. Title omitted if length too long or spine too thin)

APPENDIX F

THESIS TITLE PAGE (RESEARCH MODE)

Title of Thesis (Max 15 words)

(Font 18)

by

(Font14)

Name
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APPENDIX F

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Title of Dissertation (Max 15 words)

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APPENDIX G

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Date: 20 October 2016	Date: 25 December 2016

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APPENDIX H

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APPENDIX I

TYPESETTING FOR LISTS

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LIST OF ABBREVIATIONS

CLMP	Car-Like Mobile Platform
DC	Direct Current
DLL	Dynamic Linked Library

LIST OF SYMBOLS

N	Sample size
α	Acceleration (ms^{-2})
Ω	Resistance (ohm)

APPENDIX J

Pembangunan Algoritma Penolakan Latar Belakang Untuk Pengenalpastian Muka Biometrik

ABSTRAK

Di dalam tesis ini, diperkenalkan satu kaedah baru yang lebih baik untuk sistem automatik pengenalpastian muka. Persegmenan objek baru ataupun dinamik dalam satu imej boleh dicapai melalui teknik penolakan latar belakang ataupun persegmenan latar depan. Ini adalah suatu langkah awal kritikal dalam kebanyakan aplikasi penglihatan komputer dalam domain seperti sistem pengawasan dan interaksi manusia-komputer. Sistem yang dicadangkan mengandungi tiga tahap. Dalam tahap yang pertama, penolakan latar belakang digunakan untuk menangani masalah perubahan pencahayaan, bayang-bayang, pantulan, persamaan warna latar depan dengan warna latar belakang dan latar belakang dinamik (e.g. paparan video aktif ataupun gerakan pohon ditiup angin). Satu kaedah dicadangkan untuk memodel latar belakang yang berasaskan setiap pixel, mudah suai masa dan menggunakan gabungan Gaussian dalam kombinasi pixel jiran and warna tak varian. Kombinasi in secara sendirinya adalah baru. Dalam tahap kedua, pengurangan ralat dalam imej untuk meningkatkan kejituan dijalankan dengan munggunakan penapisan morfologi yang menghasilkan satu imej dwi-warna. Di dalam tahap ketiga pula, satu teknik yang baru untuk mencari posisi kepala di dalam imej dan mengekstraknya untuk pengesanan dan pengenalpastian. Pengujian algorithma dalam keadaan pencahayaan and persekitaran berbeza telah dijalankan. Keputusan eksperimen menunjukkan bahawa kaedah yang digunakan mempunyai ketahanan tinggi terhadap masalah-masalah yang dibangkitkan oleh penyelidik terdahulu tanpa mengorbankan prestasi masa-nyata yakni menjadikannya sesuai untuk banyak rangkaian aplikasi video yang memerlukan pengesanan dan pengenalpastian. Hasil eksperimen pada aplikasi masa sebenar menunjukkan kekuatan, keterpercayaan dan kecekapan pada pendekatan yang diusulkan; hasil eksperimen ini dapat mencari dan mengekstrak muka manusia dalam 98% daripada eksperimen, dengan kemampuan untuk mencari muka untuk pelbagai kelamin, warna kulit dan pemakaian kepala. Algoritma yang diusulkan dapat menghasilkan 30 hingga 35 FPS dalam saiz citra 320×340 pixel, di mana ianya lebih baik daripada aplikasi masa sebenar yang lain.

APPENDIX J

Development of Background Subtraction Algorithm for Biometric Identification

ABSTRACT

This thesis presents an improved approach for an automatic face detection system. Segmentation of novel or dynamic objects in a scene can be achieved using background subtraction or foreground segmentation. This is a critical early step in most computer vision applications in domains such as surveillance and human-computer interaction. The proposed system consists of three parts. In the first part, the use of background subtraction algorithm to deal with the problem of lighting changes, shadows and repetitive motions. All previous implementations fail to handle properly one or more common phenomena, such as global illumination changes, shadows, inter-reflections, similarity of foreground color to background and non-static backgrounds (e.g. active video displays or trees waving in the wind). The proposed method is a background model that uses per-pixel, time-adaptive and Gaussian mixtures in the combined input space of pixel neighborhood and luminance invariant color. This combination in itself is novel. In the second part, another technique known as morphological erosion and dilation operators are used to remove the noise in the resulting binary image to improve the accuracy. The third part is accomplished by using a new technique to locate the face position in the image and extract it for recognition and identification purposes. The algorithm has been tested in several different lighting conditions and environments. The experimental results show that the method possesses much greater robustness to problematic phenomena than the prior state of the art methods, without sacrificing real-time performance, making it well-suited for a wide range of practical applications in video events which requiring detection in real-time. The experimental results in real time applications show the robustness, reliability and efficiency in the proposed approach; they can accurately detect and extract human face 98% of the time, with the ability to detect the face of different types of people gender, skin color and head attire. The proposed algorithm can be executed at 30 to 35 FPS for an image size of 320×240 pixels, which is much better when compared with any other real time applications.

APPENDIX K

CHAPTER 5 : CONCLUSION AND FUTURE RESEARCH

1.7 cm

5.1 Introduction

1.7 cm

1.27 cm / 0.5”

This chapter presents the hardware design and development of a drive system for a CLMP. …

5.2 Motion Actuators

The chassis of the mobile platform was found to have a weight of 2.5kg, a maximum front steering angel, ϕ of 36° and …

1.7 cm

5.2.1 Stepper Motor Specification

In order to choose the stepper motors we need to know the complete weight of the mobile platform. In our design hypothesis, the platform …

APPENDIX L

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APPENDIX M

APPENDIX A SAMPLE APPENDIX 1

Table A.1: Housing Plan.

i) Program	**Fourth Plan Allocation, 1981 – 1985**	**Estimated Expenditure, 1981 – 1985**	**Fifth Plan Allocation, 1986 – 1990**
Public low-cost housing	1,712.22	1,659.06	691.79
Site and services	1.61	1.21	78.41
Government quarters	89.29	44.47	56.62
Squatters control	3.36	3.36	17.00
SEDC's and UDA	45.38	45.38	142.71
TOTAL	1,851.86	1,753.48	986.53
Note: Allocation in respect of institutional quarters and housing in land schemes are not reflected in this table as they are provided direct to the respective agencies			

APPENDIX O

CHAPTER 6 : REFERENCING AND CITATION STYLE

6.1 Citation style

The details of the references cited in the text should be located in the List of References. The list should be placed at the end of the thesis compiled either alphabetically (American Psychological Association) or numerically (IEEE) System. The style selected must be used consistently throughout the thesis. Cross citation are not allowed.

APPENDIX O

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