GUIDELINES FOR THE PREPARATION OF RESEARCH REPORTS, DISSERTATIONS AND THESES

Department of Physics
Faculty of Science
University Malaya

Latest Update: 24.05.2019, NHB

The conventional format follows the traditional monograph structure. This is the most common form of research project/dissertation/thesis used by most candidates.

Preliminary
▪ TITLE PAGE ▪ ORIGINAL LITERARY WORK DECLARATION ▪ ABSTRACT ▪ *ABSTRAK* ▪ ACKNOWLEDGEMENTS ▪ TABLE OF CONTENTS ▪ LIST OF FIGURES ▪ LIST OF TABLES ▪ LIST OF SYMBOLS AND ABBREVIATIONS ▪ LIST OF APPENDICES
Main Body
▪ CHAPTER 1: INTRODUCTION ▪ CHAPTER 2: LITERATURE REVIEW ▪ CHAPTER 3: METHODOLOGY ▪ CHAPTER 4: RESULTS ▪ CHAPTER 5: DISCUSSION ▪ CHAPTER 6: CONCLUSION ▪ REFERENCES (A CONSOLIDATED LIST OF REFERENCES FOR ALL CHAPTERS)
SUPPLEMENTARY
▪ LIST OF PUBLICATIONS AND PAPERS PRESENTED ▪ APPENDIX

FORMAT SPECIFICATIONS

✓ **Paper Quality, Printing and Duplicating**

- The research project/dissertation/thesis should be printed, single-sided, on high quality white A4 paper (201 × 297 mm; 80 grams). Computer pin-feed printout paper is not permitted.

- The research project/dissertation/thesis, in soft- and hardcover copies, must be typed and duplicated by offset printing or good quality photocopying. All copies must be clean and neat in order to ensure easy reading.

✓ **Typing and Printing Quality**

– Texts in research project/dissertation/thesis should be typed on **one side** of the paper only.

– They must be typed using font type **Times New Roman, font size 12** (except for tables and figures) and justified, using Microsoft Word version 6.0 or later, or similar word-processing software. Those written in Arabic should use font type **Traditional Arabic in font size 16.** Words in a language that is different from the language of the research project/dissertation/thesis must be typed in *italics*. For mathematical texts, the use of Equation Editor or LaTeX is advisable. Script fonts are not permitted.

– A high quality laser or ink-jet printer should be used for the printing.

cont…

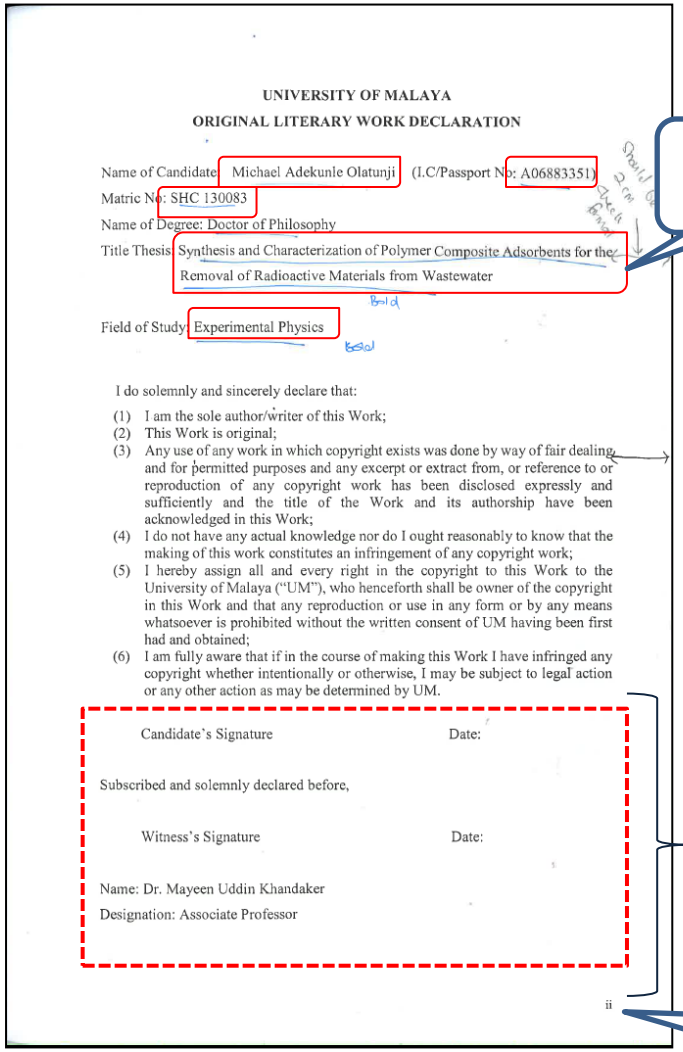
- ✓ **Line Spacing:**
  - The body of the text should be typed with **double spacing**. Single-spacing is only permitted in tables, long quotations, footnotes, citation and in the references.

- ✓ **Margins:**
  - Top : 2 cm or 0.79 inch
  - Bottom : 2 cm or 0.79 inch
  - Left : 4 cm or 1.57 inch
  - Right : 2 cm or 0.79 inch

  - The last paragraph of the page should contain at least two sentences. If it does not, the paragraph should begin on the next page.

- ✓ **Page Numbering:**
  - All page numbers should be printed 1.0 cm from the bottom edge of the page and placed at the right-hand side without any punctuation .
  - Font type Times New Roman and font size 10 are recommended for numbers.
  - Roman numerals (i, ii, iii, …) should be used in the Preliminary section. The first page of the thesis (the title page), is an unnumbered page ‘i’. Numbering begins on the second page with ‘ii’ for the Original Literary Work Declaration Form.
  - Arabic numerals (1, 2, 3, …) are used on the pages of the text (starting with the Introduction page) and Supplementary section.

ORIGINAL LITERARY WORK DECLARATION



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ORIGINAL LITERARY WORK DECLARATION

Name of Candidate: Michael Adekunle Olatunji (I.C/Passport No: A06883351)

Matric No: SHC 130083

Name of Degree: Doctor of Philosophy

Title Thesis: Synthesis and Characterization of Polymer Composite Adsorbents for the Removal of Radioactive Materials from Wastewater

Field of Study: Experimental Physics

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Witness's Signature Date:

Name: Dr. Mayeen Uddin Khandaker

Designation: Associate Professor

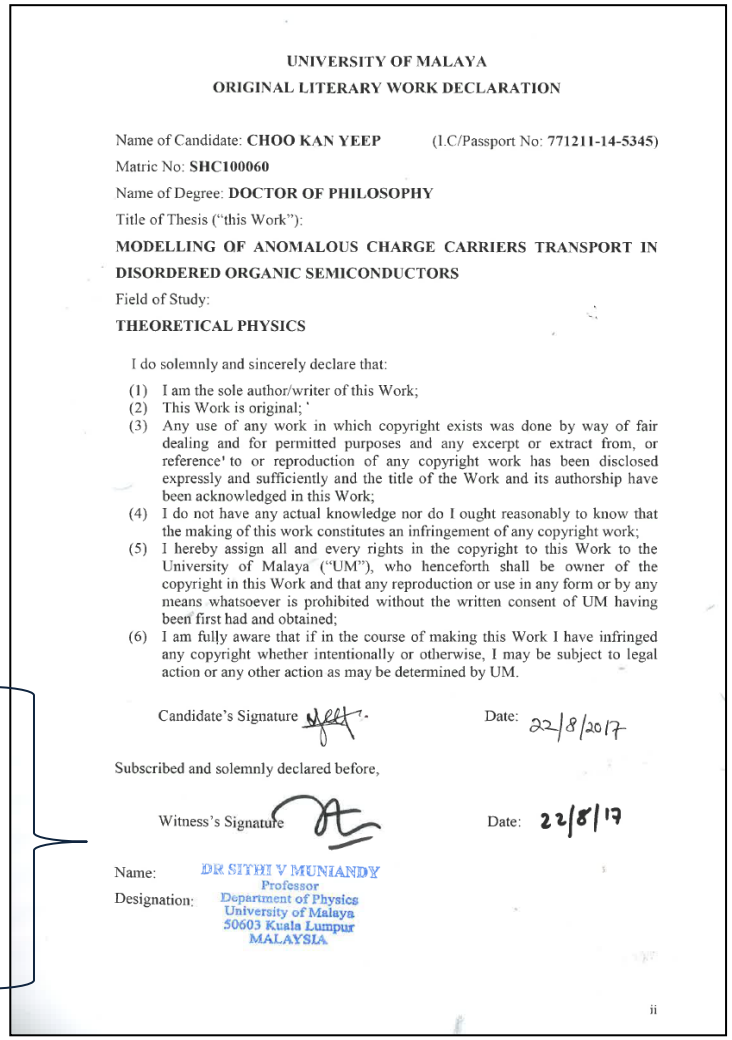
ii

Bold and capital letter

Example

- **Student signature**
- **Supervisor signature (a MUST !!)**
- **Must be on the same date.**
- **Stamp from supervisor**

Start numbering with, ii



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Name of Candidate: **CHOO KAN YEEP** (I.C/Passport No: **771211-14-5345**)

Matric No: **SHC100060**

Name of Degree: **DOCTOR OF PHILOSOPHY**

Title of Thesis ("this Work"):

MODELLING OF ANOMALOUS CHARGE CARRIERS TRANSPORT IN DISORDERED ORGANIC SEMICONDUCTORS

Field of Study:

THEORETICAL PHYSICS

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(5) I hereby assign all and every rights in the copyright to this Work to the University of Malaya ("UM"), who henceforth shall be owner of the copyright in this Work and that any reproduction or use in any form or by any means whatsoever is prohibited without the written consent of UM having been first had and obtained;
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Candidate's Signature Date: 22/8/2017

Subscribed and solemnly declared before,

Witness's Signature Date: 22/8/17

Name: DR SITHI V MUNIANDY

Designation: Professor
Department of Physics
University of Malaya
50603 Kuala Lumpur
MALAYSIA

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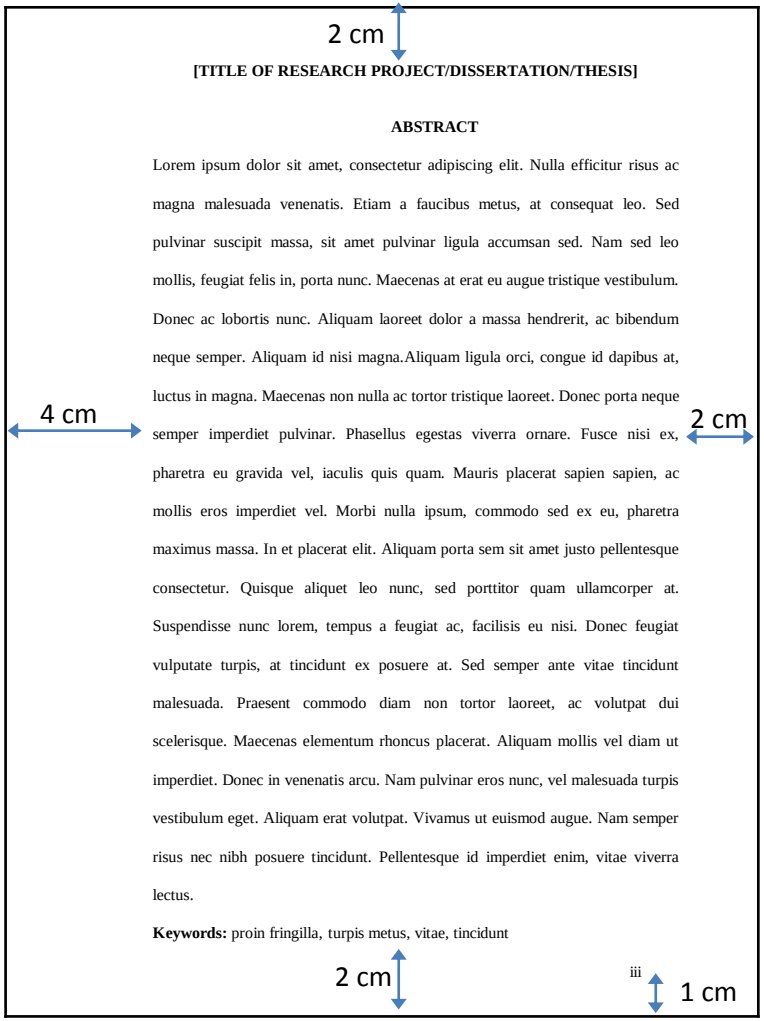
ABSTRACT

- Is a short summary of the research project/dissertation/thesis.
- Should briefly describe the objectives (problem statement), the significance of research, research methodology, as well as the findings and conclusion of the research.
- Must not exceed 500 words.
- Type in a single paragraph.
- Double-spacing.
- Written in Bahasa Malaysia and English language.
- The abstract page is assigned Roman numeral "iii" and the following pages should be numbered consecutively.
- The Abstract page begins with the title of research project/dissertation/thesis (in uppercase) that is approved by the faculty after the submission of 3 Months' Notice. Candidates are not allowed to change the title without the approval of the faculty.



ABSTRACT

Examples

NOVEL DNA-BASED ELECTRONIC PROFILING METHOD FOR SELECTED ALGAE

ABSTRACT

The utilization of deoxyribonucleic acid (DNA) in electronics has become significant and gradually accepted by researchers due to its remarkable characteristics. There are several devices and sensors that employ DNA in their fabrication process. The standard methods to detect and recognize any species of living organism are polymerase chain reaction (PCR), sequencing and microarray techniques. However, there are several drawbacks pertaining to these methods such as sample contamination, misleading results as well as being costly and involving complicated procedures. As an alternative method, this study presents a simple, fast, high sensitivity and economical novel identification method for algae-derived DNA using the electronic properties of DNA. Novel current-voltage (I-V) characteristics of chosen algal species using DNA-specific diodes were obtained and its corresponding diode parameters (turn-on voltage, shunt and series resistance, knee voltage, breakdown voltage as well as breakdown current) were then calculated in this study. Each algal species exhibits specific turn-on voltage values for example *Chlorella* sp. had a value of 1.40 V, *Synechococcus* sp. with 1.15 V and *Amphora* sp. with 1.36 V. This novel technique demonstrates an exciting potential that may have huge impact in various fields, especially in pathology and taxonomy.

Keywords: Indium tin oxide, DNA, Schottky diode, biosensor, diode parameters.

NOVEL DNA-BASED ELECTRONIC PROFILING METHOD FOR SELECTED ALGAE

ABSTRAK

Penggunaan asid deoksiribonukleik (DNA) dalam elektronik menjadi lebih penting dan semakin diterima pada masa kini oleh penyelidik kerana ciri-cirinya yang luar biasa. Terdapat beberapa peranti dan pengesan yang menggunakan DNA dalam proses fabrikasinya. Kebanyakan kaedah piawai untuk mengesan dan mengenali mana-mana spesies organisma hidup adalah reaksi berantai polymerase (PCR), teknik penjujukan dan teknik microarray. Sebaliknya terdapat beberapa kekurangan berkaitan kaedah tersebut seperti pencemaran sampel, keputusan mengelirukan serta mahal dan prosedur yang rumit. Sebagai kaedah alternatif, tesis ini membentangkan kaedah pengenalpastian baru yang mudah, cepat, sensitiviti tinggi dan praktikal digunakan untuk DNA yang berasal dari alga yang menggunakan sifat-sifat elektronik DNA. Ciri-ciri arus voltan (I-V) spesies alga yang terpilih menggunakan diod khusus DNA ditunjukkan dan parameter diod yang berkenaan (voltan putar, peredaran dan rintangan siri, voltan lutut, voltan kerosakan serta arus pecahan) kemudian dikira dalam kajian ini. Setiap spesis alga menunjukkan nilai voltan pemula yang khusus seperti *Chlorella* sp. mempunyai nilai 1.40 V, *Synechococcus* sp. dengan 1.15 V dan *Amphora* sp. dengan 1.36 V. Teknik novel ini mungkin mempunyai impak yang besar dalam pelbagai bidang, terutamanya dalam patologi dan taksonomi.

Kata kunci: Indium tin oksida, DNA, diod Schottky, pengesan bio, parameter diod.

ACKNOWLEDGEMENT

- Most research projects, dissertations or theses include a message to convey appreciation to those who have been involved and provided their assistance directly or indirectly in the preparation of the study.
- This is optional and should not exceed a single page, which is numbered in Roman numeral accordingly.

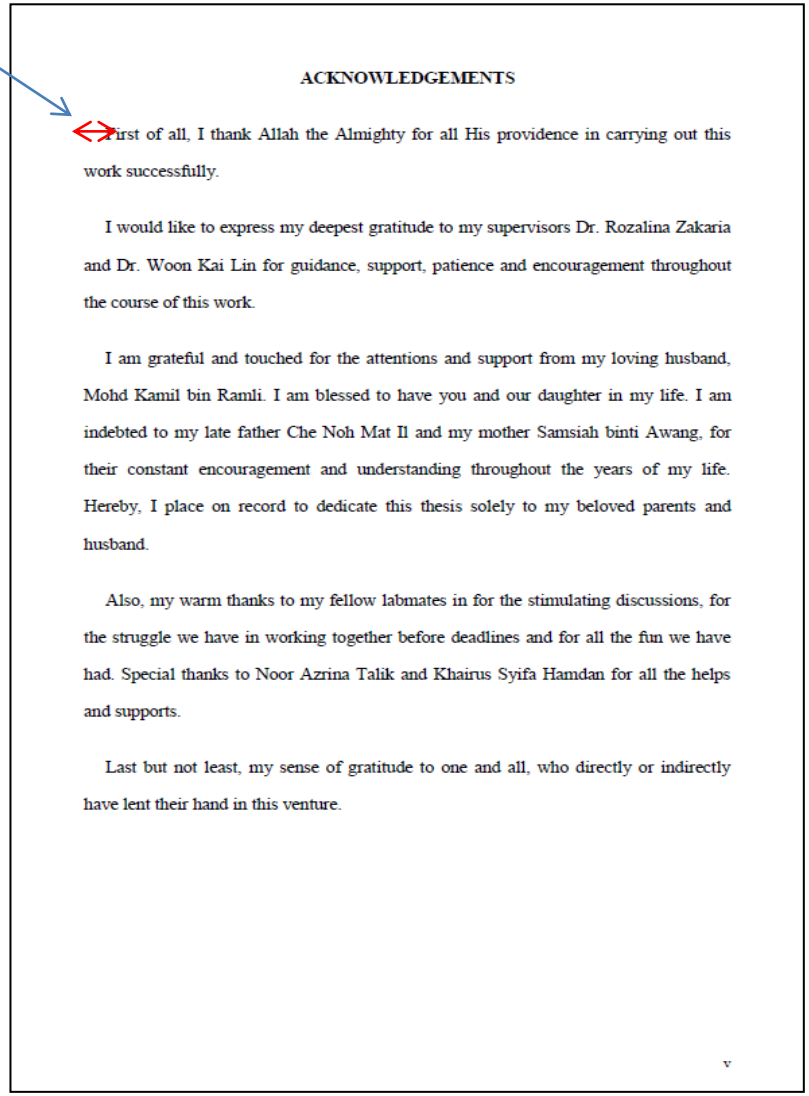


TABLE OF CONTENTS

The Table of Contents lists the chapters, topics and sub-topics together with their page numbers. Sub-topics and topics should be labelled according to the chapter, for example:

CHAPTER 1: TITLE

1.1 Topic 1

1.1.1 Sub-topic 1

CHAPTER 2: TITLE

2.1 Topic 1

2.1.1 Sub-topic 1

This numbering system provides a clear picture of the relationship between chapters and topics and shows how they are connected.

Example 1: Table of Contents.

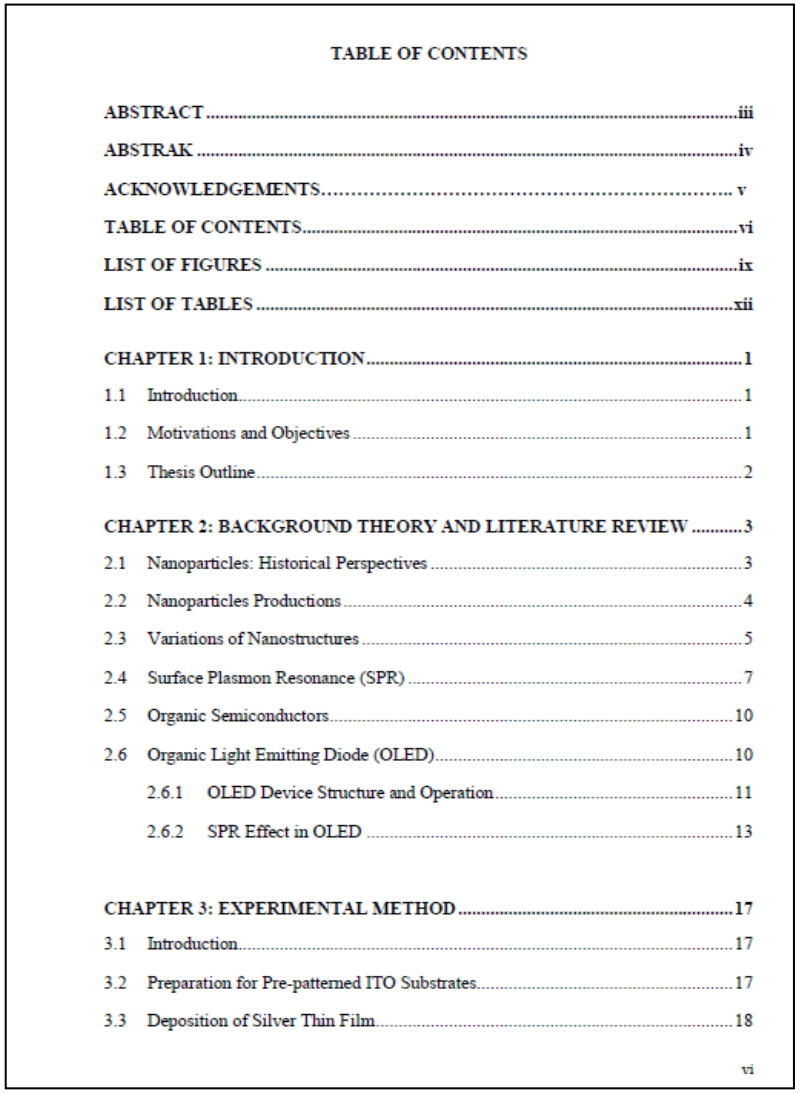
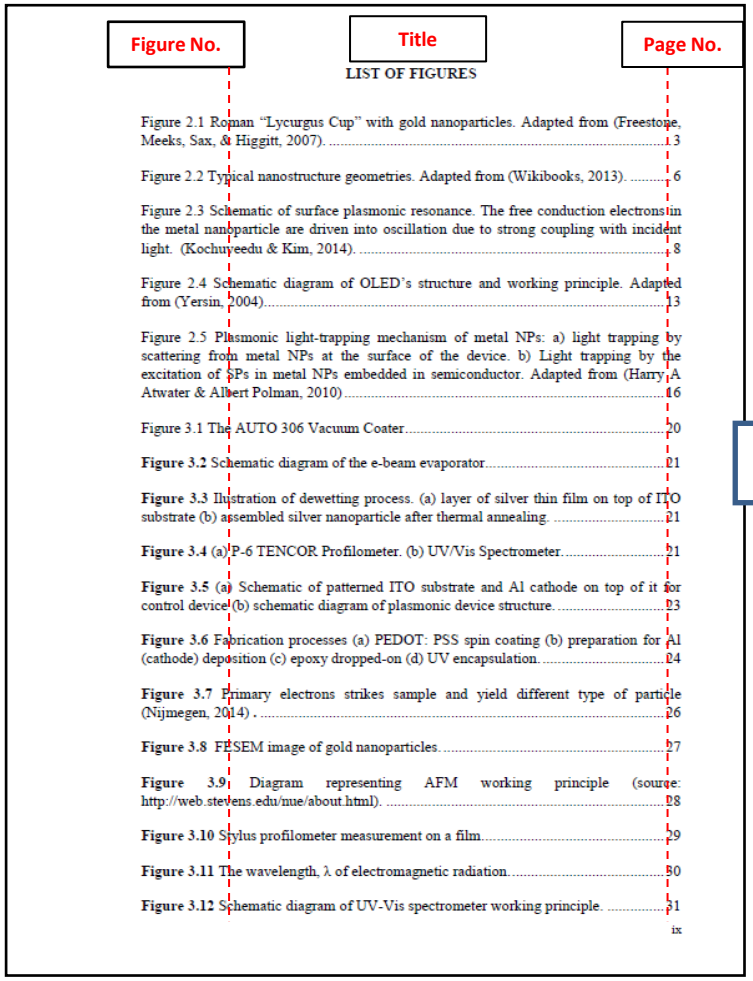


TABLE OF CONTENTS

Example 2: Table of Contents.

Example 3: Table of Contents.

LIST OF FIGURES



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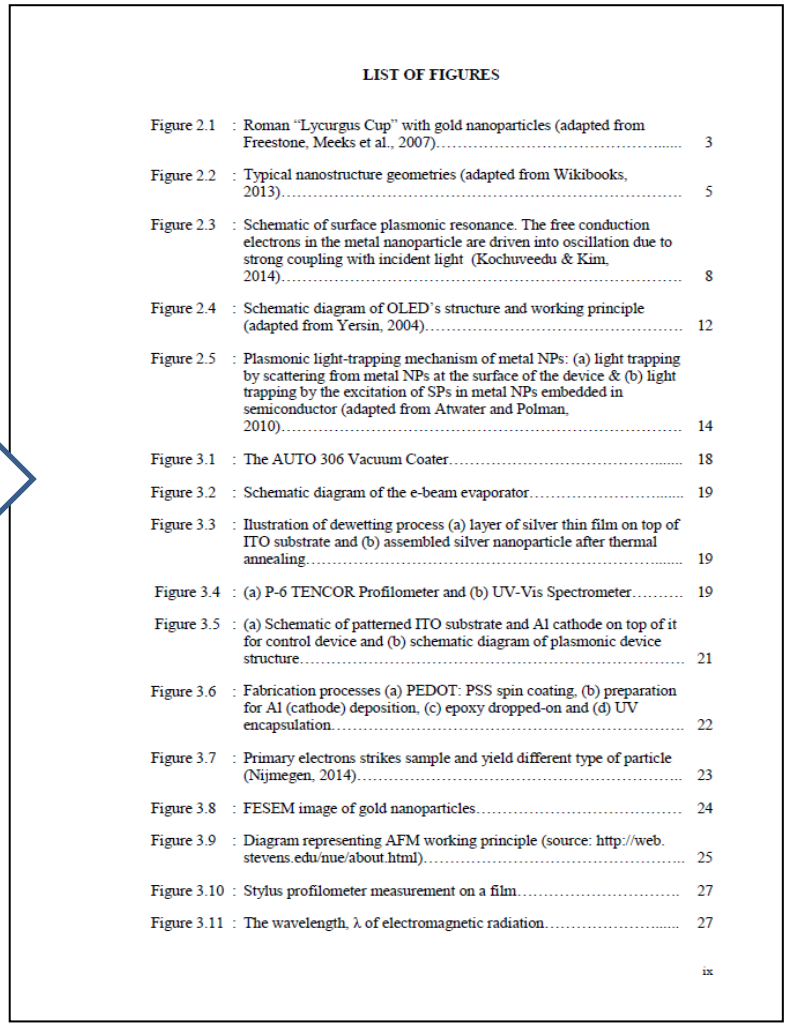
LIST OF FIGURES

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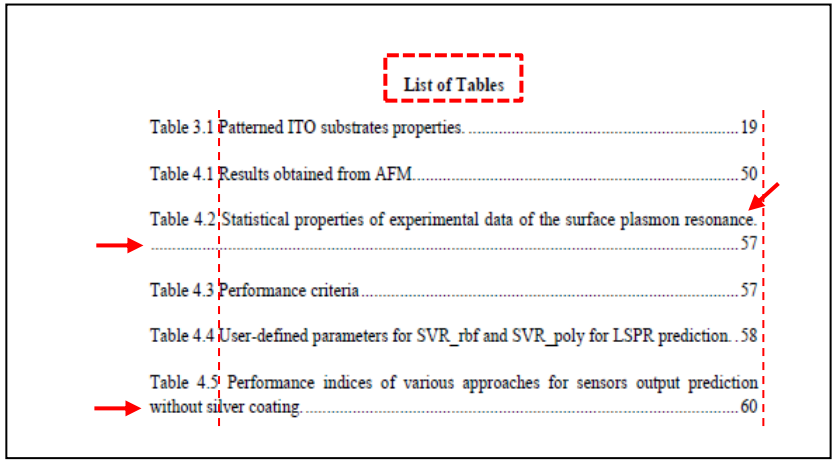
LIST OF TABLES

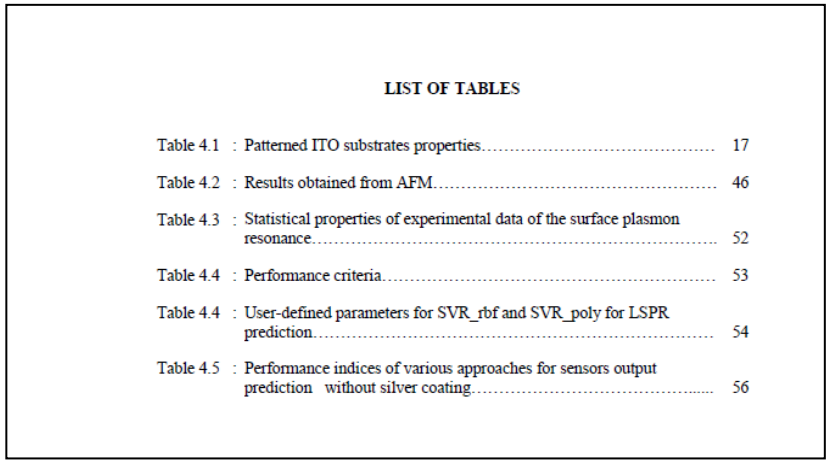
- Title should be capital letter and bold.
- Table, caption and number should be arranged in their own column.
- Single spacing for the same caption but double spacing for the next caption.
- No need bold.

Before Correction



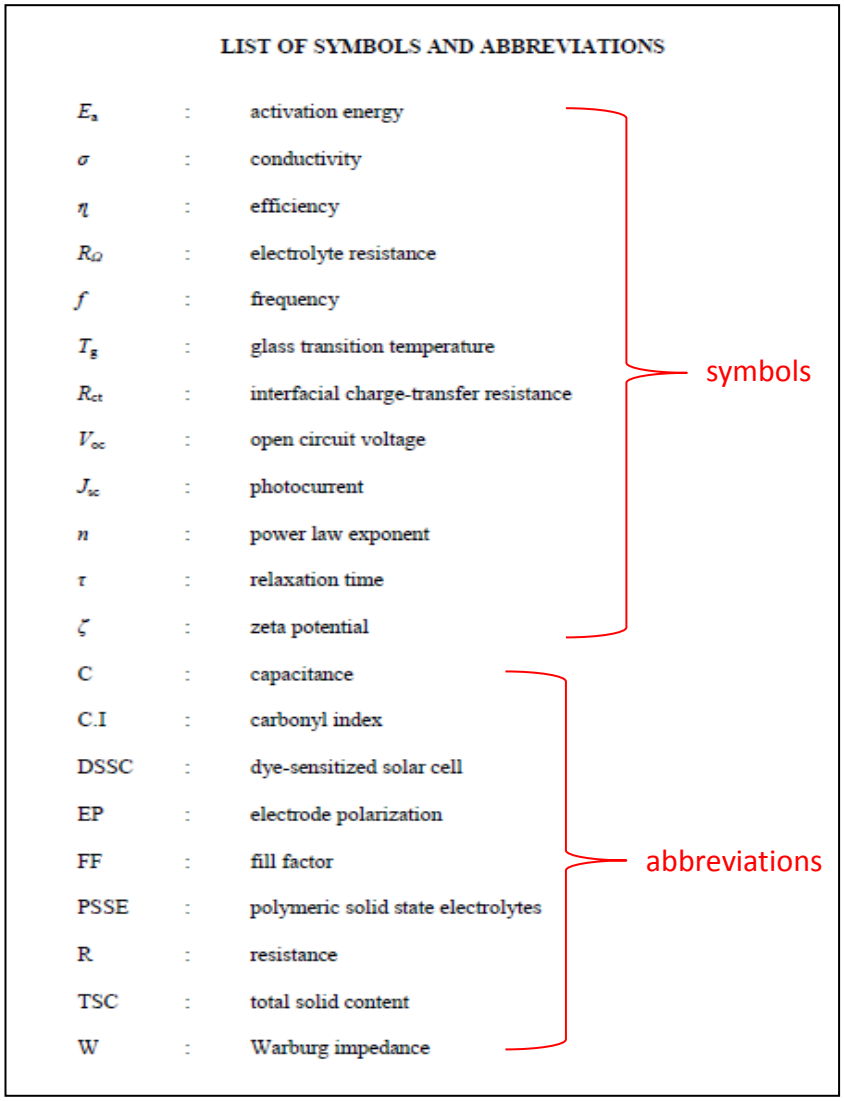
List of Tables

After Correction



LIST OF TABLES

LIST OF SYMBOLS AND ABBREVIATIONS



LIST OF SYMBOLS AND ABBREVIATIONS

E_a	:	activation energy
σ	:	conductivity
η	:	efficiency
R_Ω	:	electrolyte resistance
f	:	frequency
T_g	:	glass transition temperature
R_{ct}	:	interfacial charge-transfer resistance
V_{oc}	:	open circuit voltage
J_{sc}	:	photocurrent
n	:	power law exponent
τ	:	relaxation time
ζ	:	zeta potential
C	:	capacitance
C.I	:	carbonyl index
DSSC	:	dye-sensitized solar cell
EP	:	electrode polarization
FF	:	fill factor
PSSE	:	polymeric solid state electrolytes
R	:	resistance
TSC	:	total solid content
W	:	Warburg impedance

- Alphabetical order.
- List down the symbols (italic) than follow by abbreviations.
- Double spacing.

LIST OF APPENDICES

Example: List of Appendices

LIST OF APPENDICES

- List of appendices should be used alphabet.
- Single spacing for same appendix but double spacing for the next appendix.

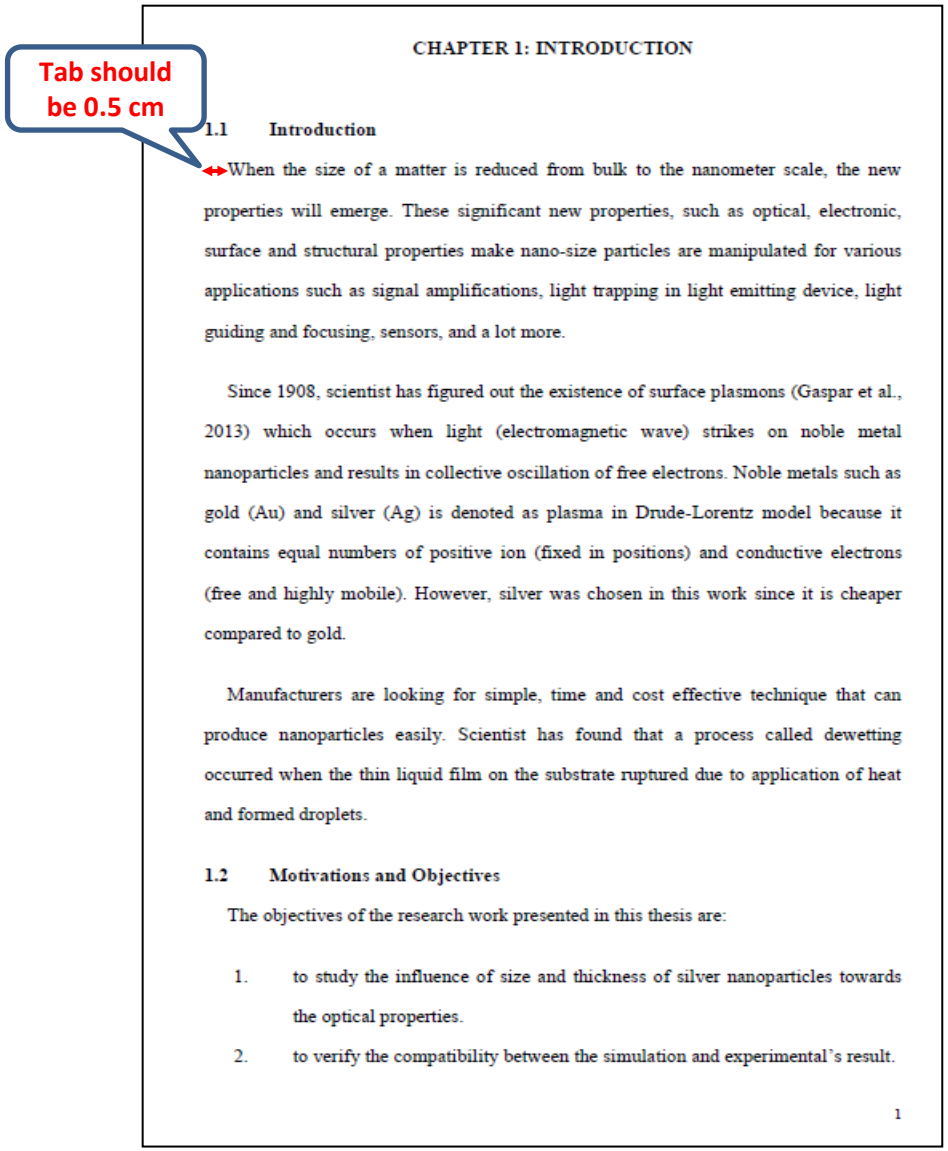
MAIN BODY

Candidates and supervisors should ensure that the text follows the agreed conventions of the individual faculty. The main text in the research project/dissertation/thesis must be organised following the guidelines as mentioned below:

- Text must be organised in titled chapters.
- The titles must reflect the content of the chapter.
- Every chapter must begin on a new page.
- Chapters can be divided into sub-chapters with corresponding sub-titles.
- Titles and sub-titles must be numbered.

Generally, a research project/dissertation/thesis will have the following basic structure:

- **INTRODUCTION**
- **LITERATURE REVIEW**
- **METHODOLOGY**
- **RESULTS**
- **DISCUSSION**
- **CONCLUSION**
- **REFERENCES**



- Chapter titles should be typed with capital letters and centred between the left and right margins.
- Each chapter must begin on a new page.
- Chapters and subchapters should be also titled.
- Titles should be typed in bold without underline.

REFERENCE CITATIONS IN TEXT

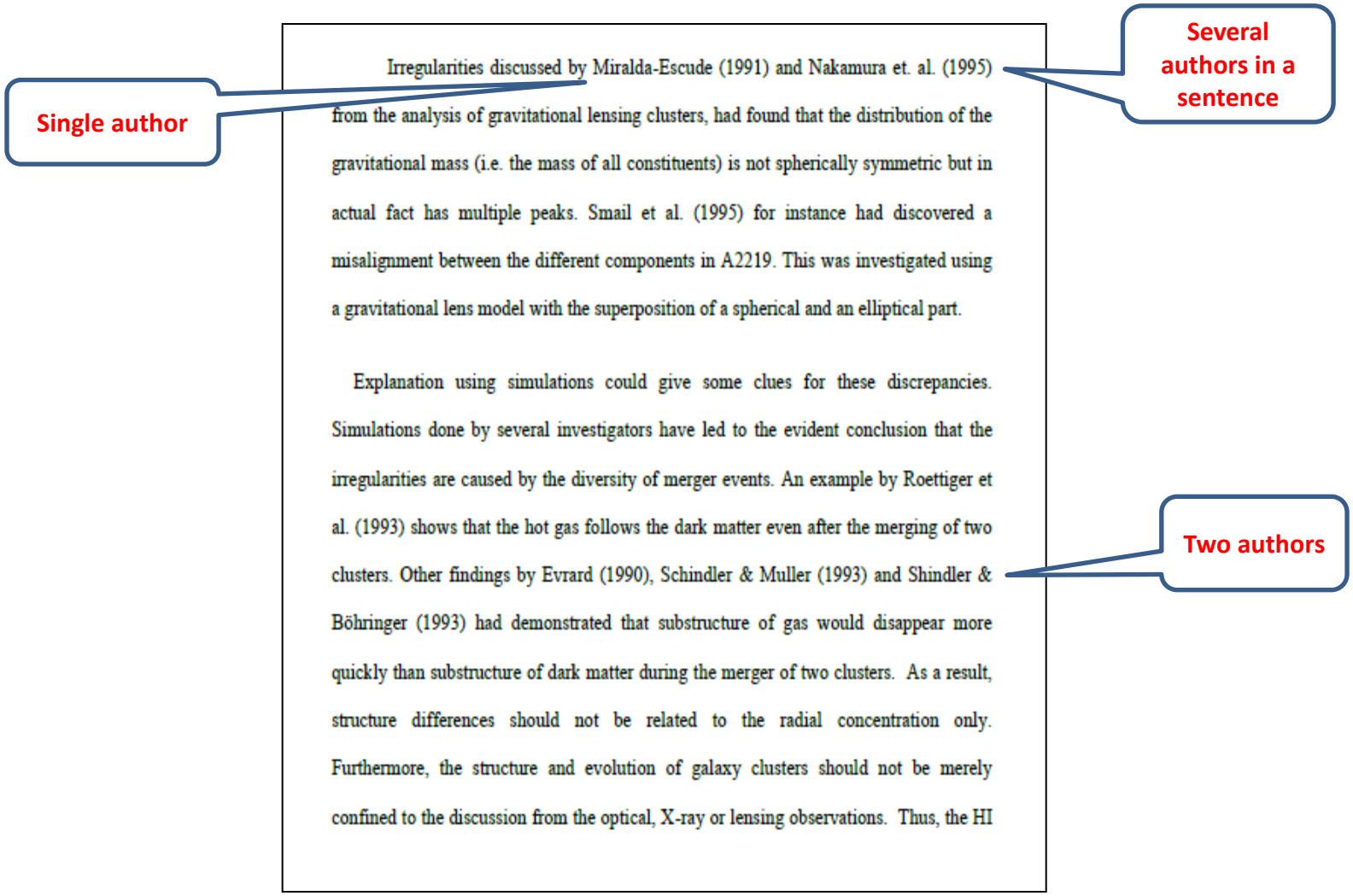
Require the following information:

- last name of the author,
- the year of publication,
- the page number for the reference (direct quotes only).

- For direct quotations or paraphrases in text:
  - Single author: Bernard (2002)
  - Two authors: Thomas & Peter (1994)
  - More than 2 authors: Wegener et al. (1994)

- For summaries the author in text:
  - Single author: (Bernard, 2001)
  - Two authors: (Thomas & Peter, 1994)
  - More than 2 authors: (Wegener et al., 1994)
  - Several authors in a sentence: (Bernard, 2002; Karnes et al., (2001); Thomas & Peter, 1994))
  - If the authors have a similar surname more than one can put a, b or c.
  - Example: (Wang et al., 1994a; Wang et al., 1994b)

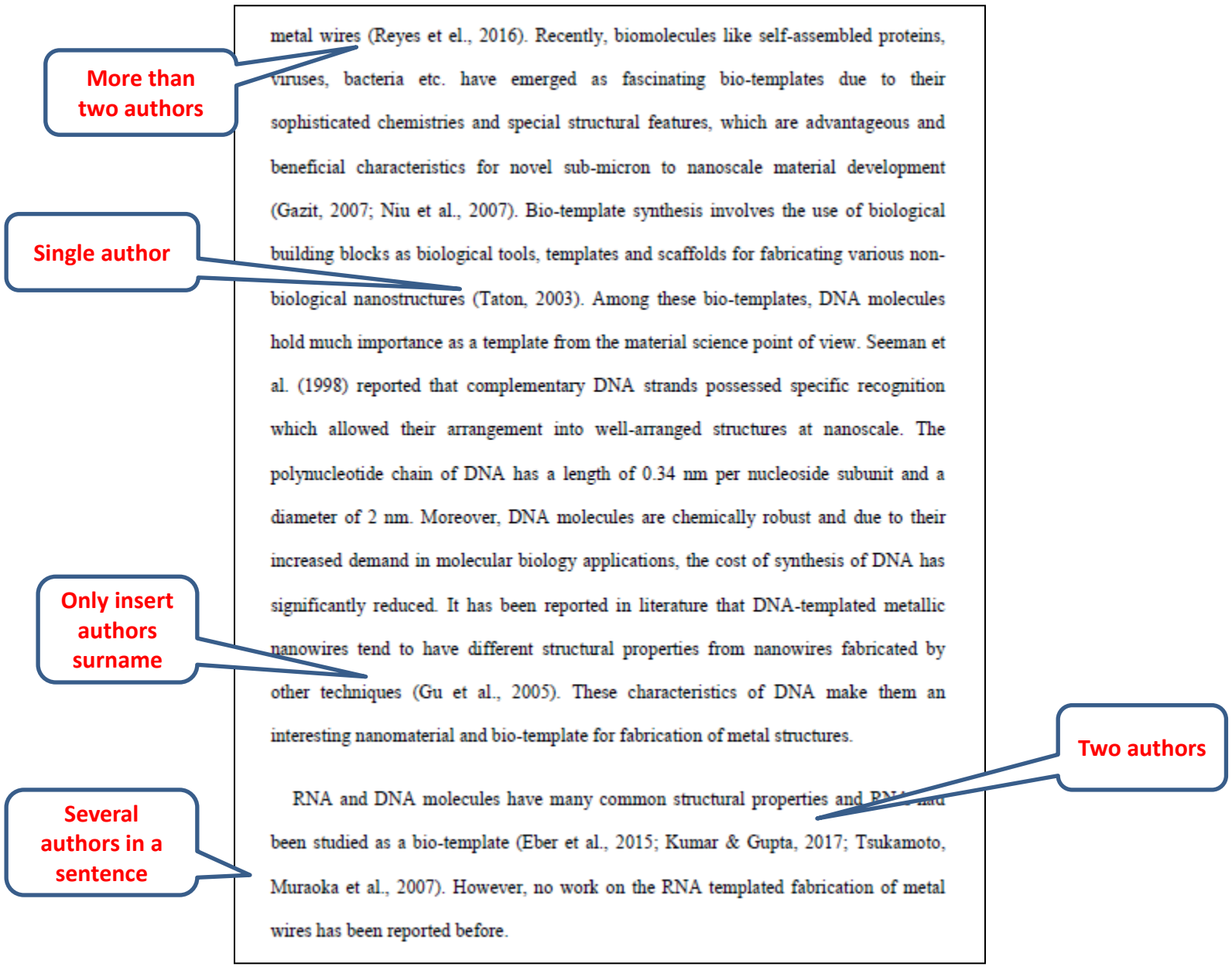
Example 2: Reference Citation in Text - For direct quotations or paraphrases in text



Irregularities discussed by Miralda-Escude (1991) and Nakamura et. al. (1995) from the analysis of gravitational lensing clusters, had found that the distribution of the gravitational mass (i.e. the mass of all constituents) is not spherically symmetric but in actual fact has multiple peaks. Smail et al. (1995) for instance had discovered a misalignment between the different components in A2219. This was investigated using a gravitational lens model with the superposition of a spherical and an elliptical part.

Explanation using simulations could give some clues for these discrepancies. Simulations done by several investigators have led to the evident conclusion that the irregularities are caused by the diversity of merger events. An example by Roettiger et al. (1993) shows that the hot gas follows the dark matter even after the merging of two clusters. Other findings by Evrard (1990), Schindler & Muller (1993) and Shindler & Böhringer (1993) had demonstrated that substructure of gas would disappear more quickly than substructure of dark matter during the merger of two clusters. As a result, structure differences should not be related to the radial concentration only. Furthermore, the structure and evolution of galaxy clusters should not be merely confined to the discussion from the optical, X-ray or lensing observations. Thus, the HI

Example 1: Reference Citation in Text - For summaries the author in text



metal wires (Reyes et el., 2016). Recently, biomolecules like self-assembled proteins, viruses, bacteria etc. have emerged as fascinating bio-templates due to their sophisticated chemistries and special structural features, which are advantageous and beneficial characteristics for novel sub-micron to nanoscale material development (Gazit, 2007; Niu et al., 2007). Bio-template synthesis involves the use of biological building blocks as biological tools, templates and scaffolds for fabricating various non-biological nanostructures (Taton, 2003). Among these bio-templates, DNA molecules hold much importance as a template from the material science point of view. Seeman et al. (1998) reported that complementary DNA strands possessed specific recognition which allowed their arrangement into well-arranged structures at nanoscale. The polynucleotide chain of DNA has a length of 0.34 nm per nucleoside subunit and a diameter of 2 nm. Moreover, DNA molecules are chemically robust and due to their increased demand in molecular biology applications, the cost of synthesis of DNA has significantly reduced. It has been reported in literature that DNA-templated metallic nanowires tend to have different structural properties from nanowires fabricated by other techniques (Gu et al., 2005). These characteristics of DNA make them an interesting nanomaterial and bio-template for fabrication of metal structures.

RNA and DNA molecules have many common structural properties and RNA has been studied as a bio-template (Eber et al., 2015; Kumar & Gupta, 2017; Tsukamoto, Muraoka et al., 2007). However, no work on the RNA templated fabrication of metal wires has been reported before.

Among various metal NPs, Ag NPs have exhibited the most effective light trapping potential due to their strong light scattering and surface plasmon strength (Gaspar et al., 2013). In addition, SPR absorption spectra of silver nanoparticles (Ag NPs) can be controlled from 300 (ultraviolet (UV)) to 1200 nm (near-infrared (NIR)) (Chen et al., 2012; Rycenga et al., 2011). The ability of metal NPs for SPR effect depends on its dielectric function ε including a real part ε_r and an imaginary part ε_i, both of which vary with excitation wavelength λ. (Rycenga et al., 2011) The SPR effect of metal NPs with spherical structure can be described using the extinction (absorption + scattering) cross-section based on Mie theory (Mulvaney, 1996),

$$C_{ext} = \frac{24\pi^2 R^3 \varepsilon_m^{\frac{3}{2}}}{\lambda}\left[\frac{\varepsilon_i}{(\varepsilon_r+2\varepsilon_m)^2+\varepsilon_i{}^2}\right] \quad (2.2)$$

where C_{ext} is the extinction cross-section, R is the NP radius, and ε_m is the relative dielectric constant of the matrix surrounding the metal NPs. This equation implies that dielectric properties have strong effect on the interaction between light and metal NPs.

In addition, the SP strength (or damping) of metal NPs can be expressed using the quality factor (QF) (Ru & Etchegoin, 2009),

$$QF = \frac{w(\frac{d\varepsilon_r}{dw})}{2(\varepsilon_i)^2} \quad (2.3)$$

SP strength is proportional to QF. Specifically, high QF indicates strong plasmons and low QF means weak SP with a small C_{ext}. Ag has higher QF than do other metals over the spectrum from 300 to 1200 nm. Interband transitions (IBTs), which are excitations of electrons from the conduction band to higher energy levels, are key factor for the SP strength. (Perner et al., 1997) In Ag, these transitions occur at much higher energies

- Used Equation Editor.

All symbol should be *italic.*

- Equation must be numbered and written in bracket.
- The first number should be corresponded to the chapter's number.

FIGURES

Figures, like tables are printed within the body of the text at the centre of the frame and labelled according to the chapter in which they appear. Thus, for example, figures in Chapter 3 are numbered sequentially: Figure 3.1, Figure 3.2.

Figures, unlike text or tables, contain graphs, illustrations or photographs and their labels are placed at the **bottom** of the figure rather than at the top.

If the figure occupies more than one page, the continued figure on the following page should indicate that it is a continuation: for example:

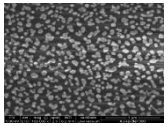


Figure 3.2, continued.

If the figure contains a citation, the source of the reference should be placed after the label.

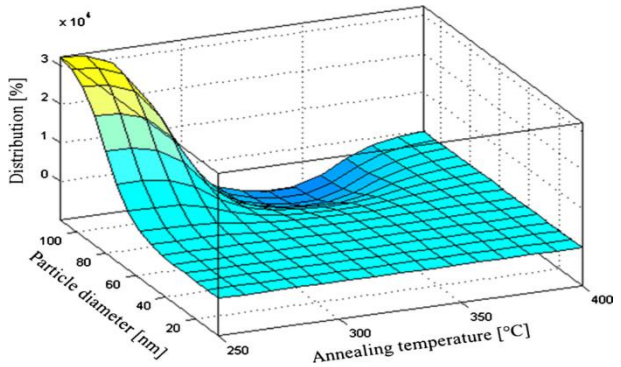


Figure 3.1: ANFIS prediction of distribution of different sizes of granular structures at certain annealing temperature.

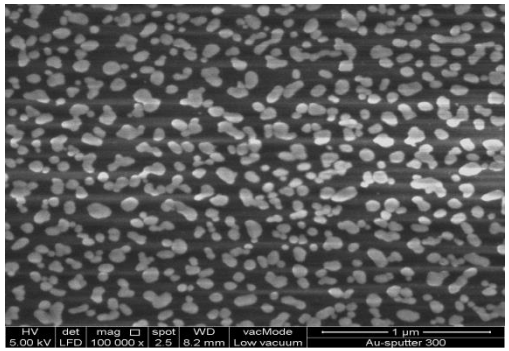


Figure 3.2: FESEM image of gold nanoparticles.

TABLES

Tables are printed within the body of the text at the centre of the frame (one line) justified (if more than one line) and labelled according to the chapter in which they appear. Thus, for example, tables in Chapter 3 are numbered sequentially: Table 3.1, Table 3.2 and so on.

The caption should be placed **above** the table itself (Table 3.1). If the table contains a citation, the source of the reference should be included in the table caption.

If the table occupies more than one page, the continued table on the following page should indicate that it is a continuation, for example: 'Table 3.1, continued.'. The header row should also be repeated.

Table 3.1: Example of table.

Heading	Heading
1	Text
2	Text
3	Text

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Table 3.1, continued.

Heading	Heading
4	Text
5	Text
6	Text

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Table 3.2: Parameters of DSSCs for GPE samples in the system.

Heading	Heading
System 1	Text
System 2	Text
System 3	Text

FOOTNOTES

There are differences in the use of footnotes in various disciplines. For example, footnotes are commonly used in Social Sciences but rarely in Science and Technology. However candidates are advised to limit the use of footnotes unless they are proved necessary to the document. Footnotes are used to elaborate or provide additional information regarding matters discussed in that page.

Footnotes are recorded using Arabic numeric and numbered consecutively. Raised superscript numerals in the text refer to explanatory notes and documented sources appearing either at the bottom of the page as footnotes or at the end of the thesis as endnotes in a notes section. The advantage of using notes is that explanatory type of information can be presented along with source citations on the same page or place.

Footnotes should use a smaller font than the text (font size 8).

When using footnote, a number formatted in superscript is inserted following the punctuation mark in the text. Footnotes should be placed at the bottom of the page on which they appear. Please refer to the faculty for the recommended convention for writing of footnotes.

Scientists examined, over several years, the fossilized remains of the wooly-wooly yak.[1]

_____

[1] While the method of examination for the wooly-wooly yak provides important insights to this research, this document does not focus on this particular species.

Example of footnote (Source: IPS).

REFERENCES

- All works or studies referred to in the research report/dissertation/thesis in the form of quotations or citations must be included in the references.
- The references should be written consistently in the American Psychological Association (APA) format or in another format approved by the Faculty.
- Each reference should be written in single spacing format and a double space between references.
- The list of references must be arranged in alphabetical order and the entries should not be numbered. The list must also have a hanging indentation of 0.5 inch.

REFERENCES

Examples

Aberle, A. G. (2009). Thin-film solar cells. *Thin Solid Films, 517*(17), 4706-4710.

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LIST OF PUBLICATIONS AND PAPERS PRESENTED

List of publications

1. **Shakir.** S, Abd-ur-Rehman, H.M., Yunus, K., Moi P.S., Iwamoto, M., & Periasamy, V. (2018). Fabrication of un-doped and magnesium doped TiO_2 films by aerosol assisted chemical vapor deposition for dye sensitized solar cells. *Journal of Alloys and Compounds*, *737*, 740-747.

2. **Shakir,** S., Saravanan, J., Rizan, N., Babu, K. J., Aziz, M. A., Moi, P. S., Periasamy, V., & Kumar, G. G. (2017). Fabrication of capillary force induced DNA template Ag nanopatterns for sensitive and selective enzyme-free glucose sensors. *Sensors and Actuators B: Chemical*, *256*, 820-827.

3. **Shakir.** S., Yiing Y. F., Rizan. N., Abd-ur-Rehman, H. M., Yunus, K., Moi P. S., & Periasamy,V. (2017). Electro-catalytic and structural studies of DNA templated gold wires on platinum/ITO as modified counter electrode in dye sensitized solar cells. *Journal of Material Science; Materials in Electronics*, *29*(6), 4602-4611.

Papers Presented

1. **Shakir,** S., Yunus, K., & Vengadesh, P. (2017). *Electrochemical properties of RNA templated Au nanowires to be used as a counter electrode in dye sensitized solar cells*. Paper presented at the 6th International Conference on Functional Materials and Devices (ICFMD), 15-18 August 2017, Melaka, Malaysia.

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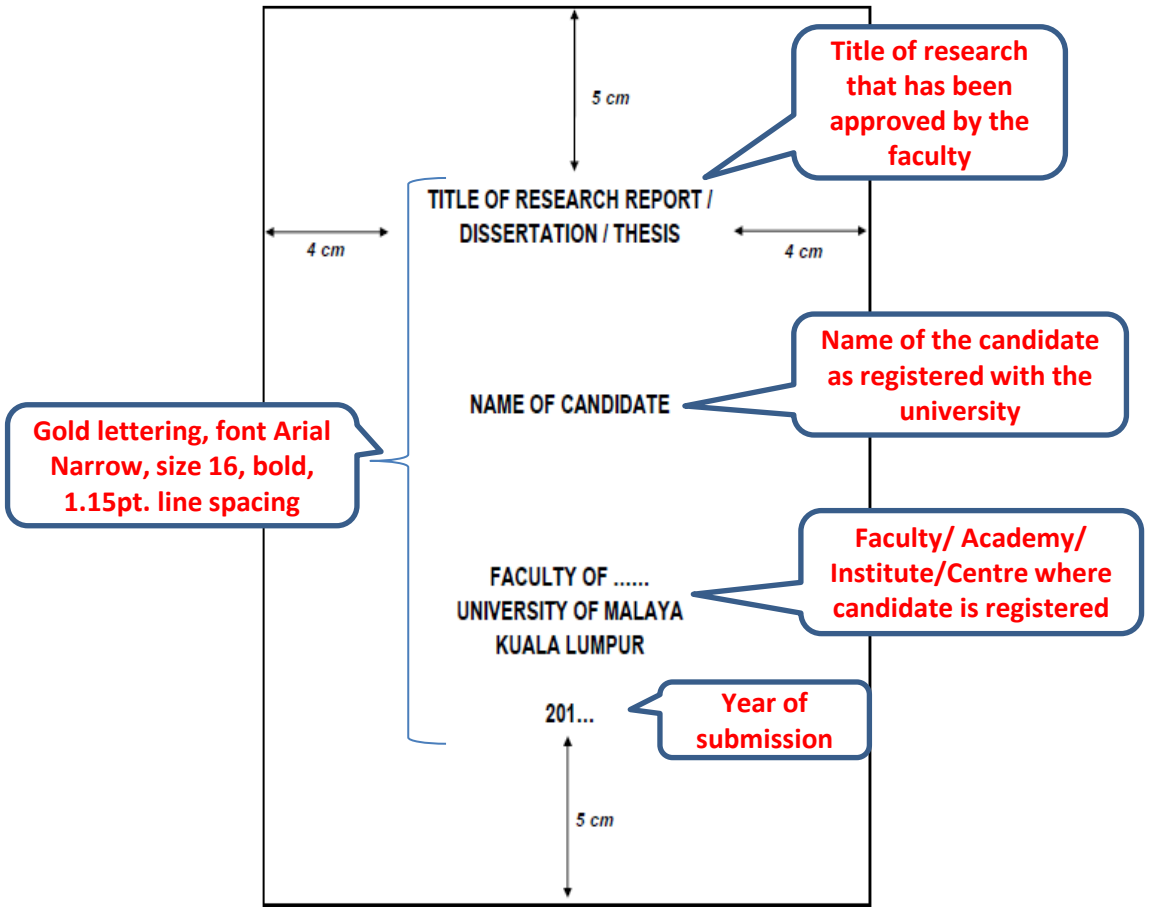

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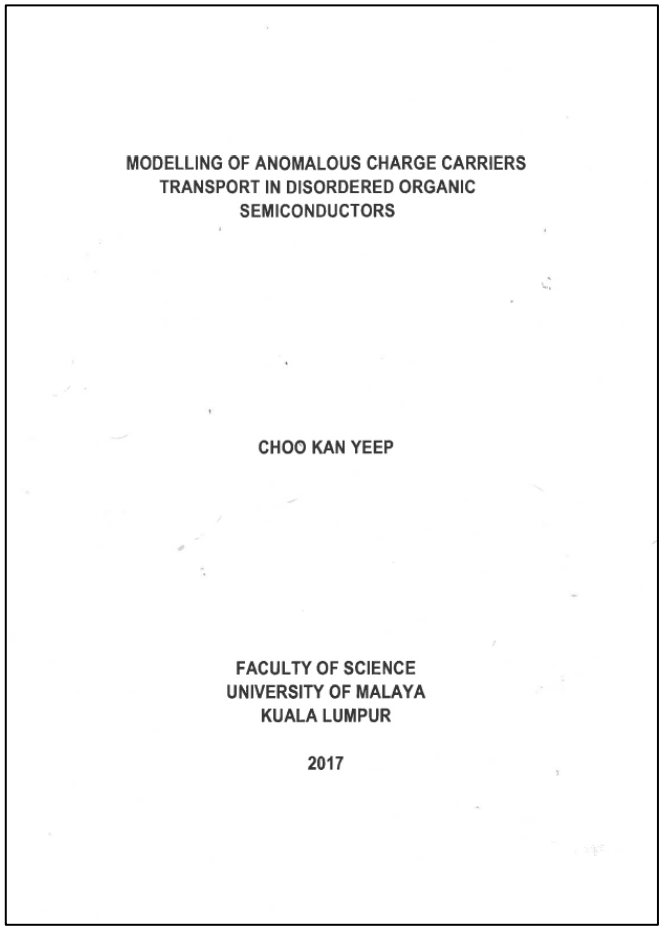

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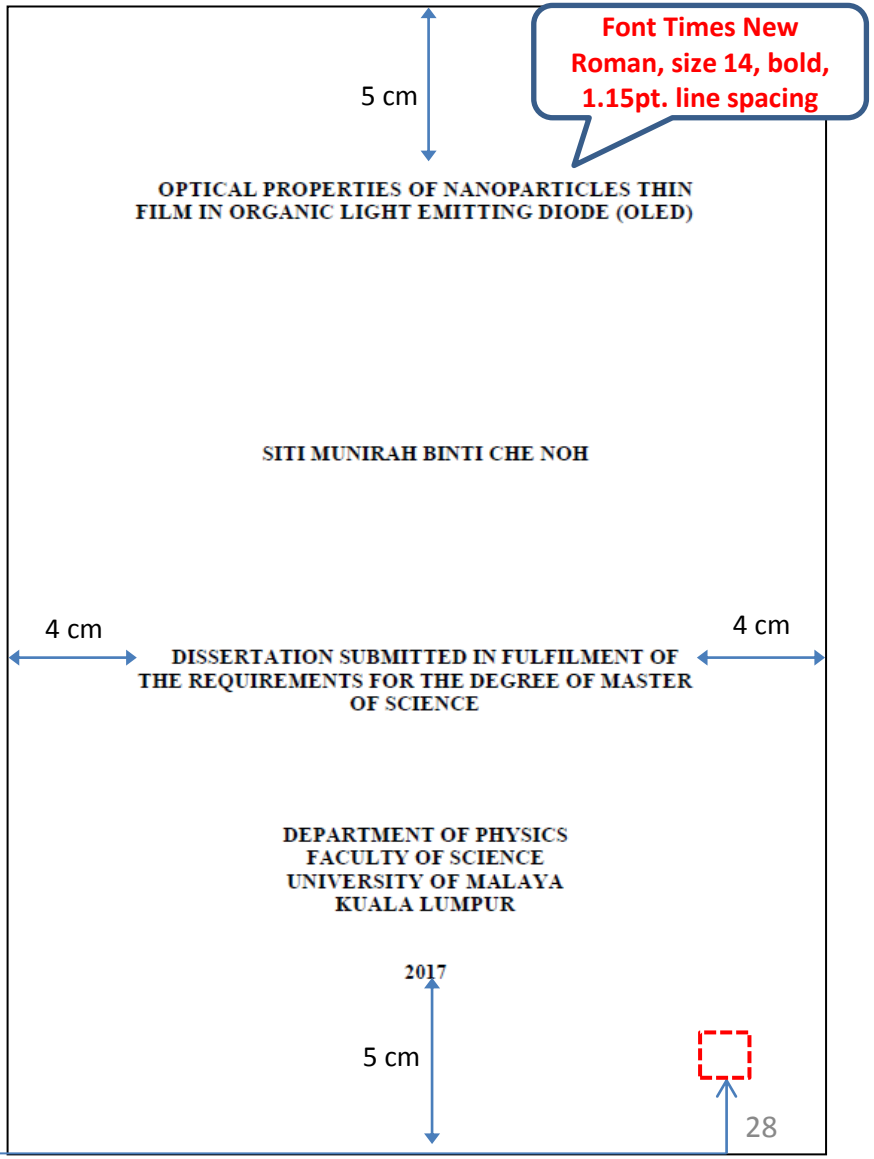

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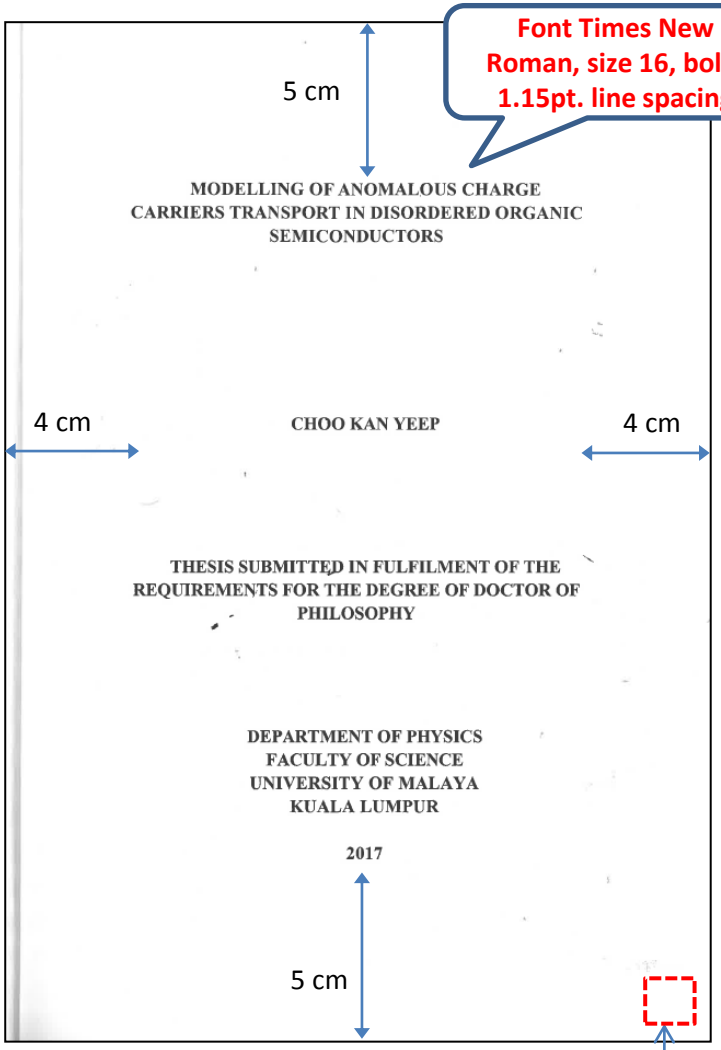

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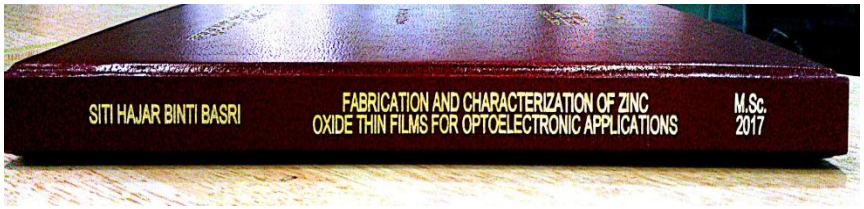

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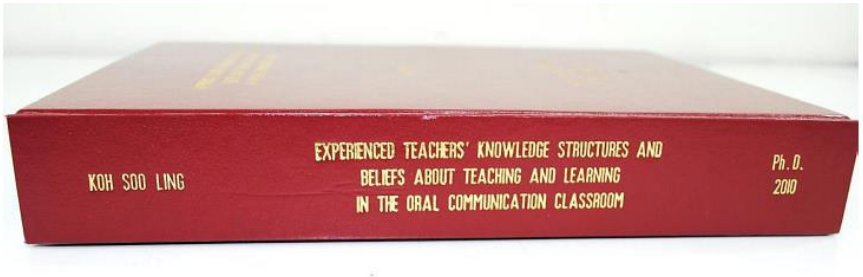

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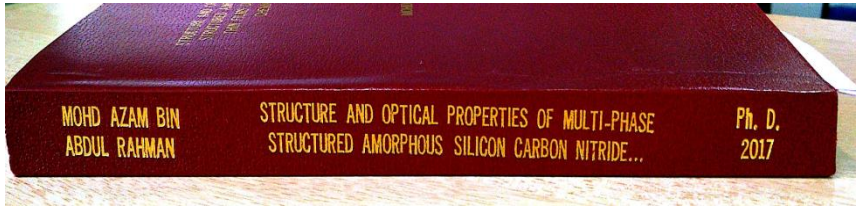

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