



**2018**

# Engineering Research Project Guidebook – Thesis Writing *Version 2*



**Engr. Reynaldo Perez-Ramos, PhD**  
College of Engineering and Technology  
ROMBLON STATE UNIVERSITY

MIMAROPA Region  
PHILIPPINES

**VERSION 2**

6/7/2018

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**DESIGN, DEVELOPMENT AND SIMULATION OF AN AUTOMATED  
KILOWATT-HOUR METER WITH PILFERAGE AND POWER SURGE  
PROTECTION SYSTEM**

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**A Thesis Presented to the  
Faculty of the College of Engineering and Technology  
Romblon State University  
Odiongan, Romblon**

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**In Partial Fulfilment of the Requirements for the Degree of  
BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING**

**By:**

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**Rodison S. Agascon  
Paolo P. Alano  
Jabel Faeldan  
Kim D. Fetalver  
Francis F. Feudo  
Grant Alvin F. Feudo  
Marchie Ann A. Rubio**

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**March 2018**

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**APPROVAL SHEET**

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The thesis entitled, "TITLE OF THE STUDY IN CAPITAL LETTERS", prepared and submitted by NAMES OF THE STUDENT RESEARCHERS (COMPLETE SURNAME, FIRST NAME INITIALS, MIDDLE INITIALS) IN CAPITAL LETTERS, in partial fulfilment of the requirements for the degree of BACHELOR OF SICENCE IN ELECTRICAL ENGINEERING is hereby accepted for oral examination.

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Chairman, Panel of Examiners

ENGR. BILSHAN SERVANEZ, PhD  
Member, Panel of Examiners

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ENGR. JUNREY D. GARCIA  
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Accepted in partial fulfilment of the requirements for the degree of BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING.

ENGR. JUNREY D. GARCIA  
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ENGR. BILSHAN F. SERVANEZ, PhD  
Dean, College of Engineering and Technology  
Date: \_\_\_\_\_

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## ACKNOWLEDGMENT

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The students would like to express their gratitude and since thanks to the people who assisted and guided them in making this research proposal successful. **(LIMIT TO ONE PAGE ONLY).**

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Agascon, R.  
Alano, P. P.  
Fetalver, K. D.  
Feudo, F. F.  
Rubio, M A.A

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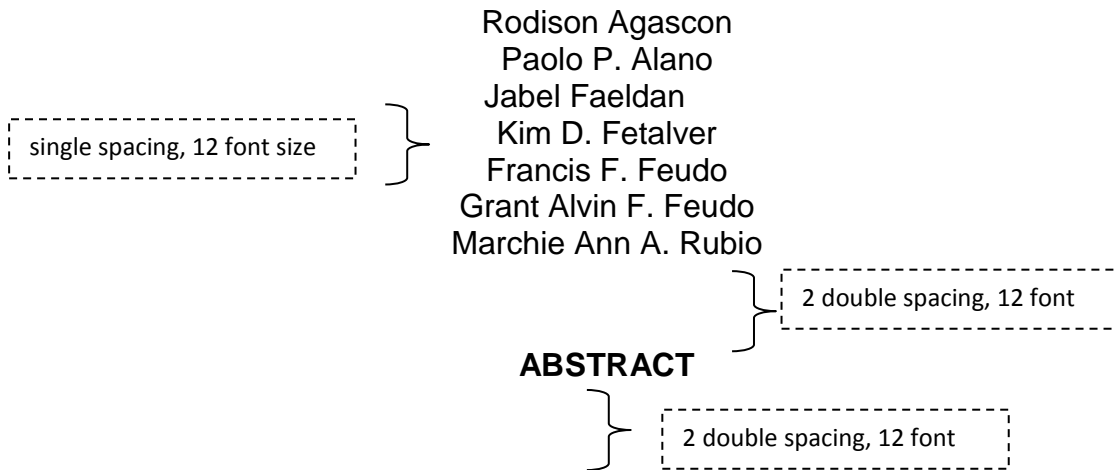
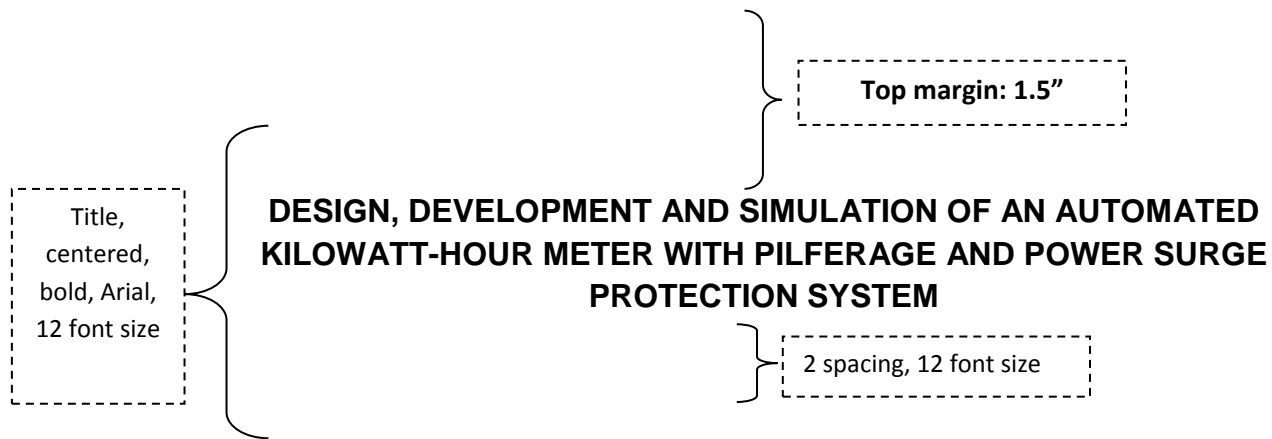
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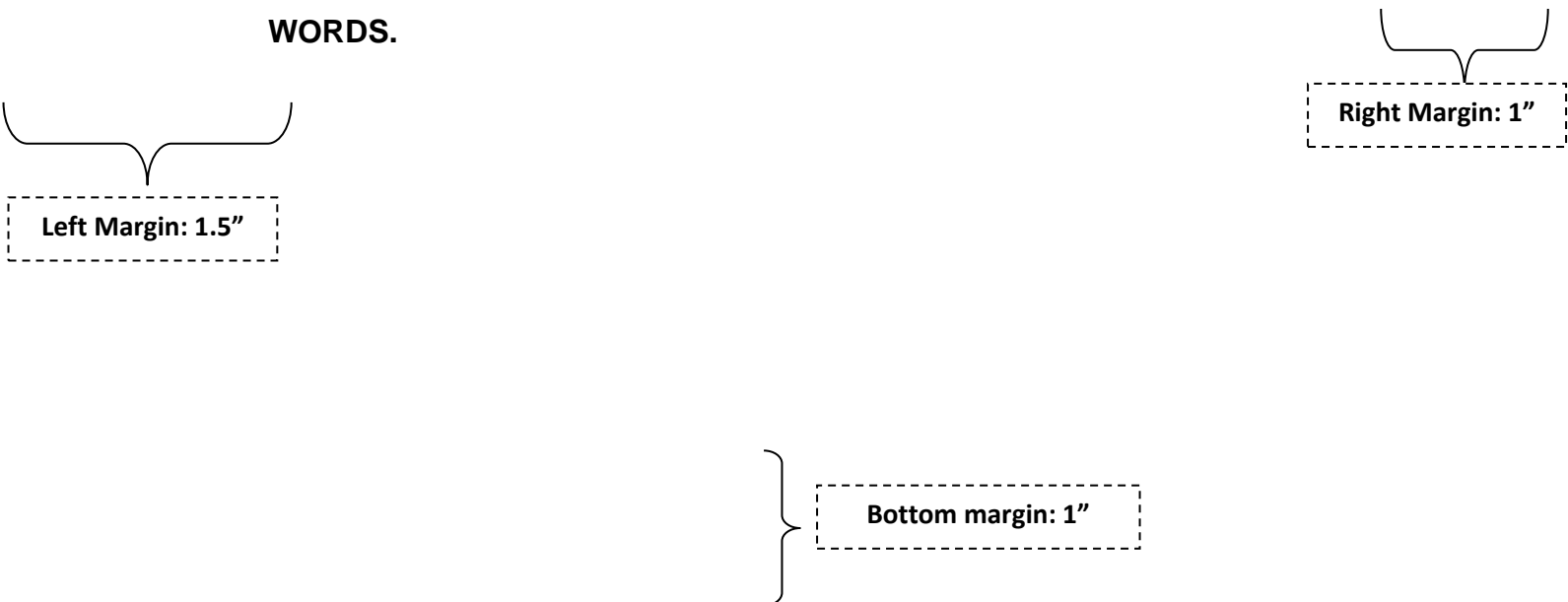
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The abstract is a brief and concise descriptive summary of the study which contains the statement of the problem or the main objective of the study, research design, significance of the study, research instruments, techniques, data gathering procedure, data processing method, findings, conclusions, and recommendations.

**LIMIT TO 1-2 PAGES FOR THE ABSTRACT. MAXIMUM OF 250 WORDS.**



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**CHAPTER I**

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**INTRODUCTION**

This chapter presents the background of the study, objectives of the problem, significance of the study, scope, and delimitation of the research study.

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**BACKGROUND OF THE STUDY**

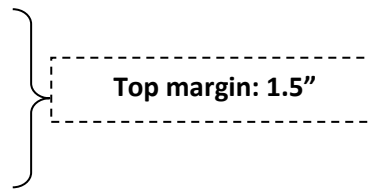
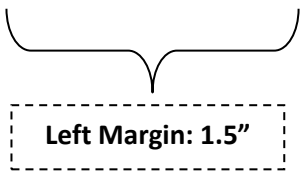
This section of the report provides the overview discussion of the study, particularly the research problem – the “rationale” (basis, motivation, justification) of doing the research. Highlights of the related literature review are included in this section by citing important phrases and sentences from relevant secondary sources of information. This will also provide the reader general idea and impression about the topic under study (Ramos, 2015; Perez, et al., 2011).

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**STATEMENT OF THE PROBLEM/OBJECTIVES OF THE STUDY**

The statement of the research problem must be brief but comprehensive and should have practical importance. A good problem statement is concerned with relation between two or more variables. It is stated clearly without ambiguity and is capable of empirical testing. Thus, the statement of the problem is in a simple language. It is specific, clear and limited. It directs the researcher and the research process, and suggests a specific answer or conclusion. It is the “verbalization of the “questions” which the study proposes to answer.

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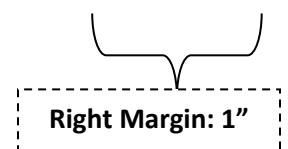
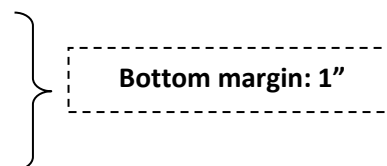
On the other hand, the main objective of the research study is a statement of purpose because this is the guide to be accomplished by the researcher in conducting the research.

**Example A:** The main objective is to analyze and evaluate the electrical system of the main campus of Romblon State University (RSU). Specifically, it attempts to achieve the following research objectives:

- (1) To calculate the total load capacity of the transformers that can hold the power requirements of the RSU-main campus;
- (2) To calculate the total power rating used in the university; and
- (3) To determine the maximum and minimum loading capacities used in the university.

**Example B:** This study aims to design and develop an inlet valve using Bluetooth technology. In particular, the study attempts to answer the following research questions:

- (1) What is the distance of the blue-valve from the Bluetooth technology for water supply control system application in both residential and commercial buildings?
- (2) What is the cost in the application of Bluetooth technology for water supply control system?
- (3) What the level of performance of the developed water supply control system?



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## SIGNIFICANCE OF THE STUDY

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This section of the report explains the contributions of the study either to a body of scientific knowledge, to practitioners/researchers in the same area of the research, or to any other group (students, local community, etc.) which benefit from the outcomes or results of the study. In other words, this answers the following questions: Why is it important for the research study to be conducted? Who will benefit from it, and what benefits could be derived from the results of the study? The research should clearly explain the intention of the researcher, the relevance, and the important implications of the study in solving a problem or a need of the society or community, knowledge gaps, or enriching existing research instruments and methods.

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## SCOPE AND DELIMITATION OF THE STUDY

This section explains the coverage or extent of the study area, the subject being focused by the study, the research instruments or methods, duration of the study, and the constraints or limitations that have direct implication on the result of the study. It provides the overall condition of the study in terms of scope and restriction that will have a substantial bearing on the result of the study.

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## CHAPTER II

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### LITERATURE REVIEW

This chapter presents the legal bases, literature, and studies which are relevant to the research study. The main purposes of the literature review are (a) to determine the similarities and differences of the on-going study and past studies; (b) to acquire additional insights and ideas related to the problem being addressed in the study. Observe proper referencing or citation of the sources of information, using the American Psychological Association (APA) styles to avoid copying or "plagiarism" or infringement. Plagiarism is a violation of Republic Act 8293 known as the Intellectual Property Code of the Philippines. This act provides legal basis in proper use of passages, writings, ideas and statements of other authors/writers by giving due credit of their work.

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### RELATED LITERATURE

This sub-section of the literature review covers those related literature from published articles, books, journals that have connection or linkages to the study conducted.

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### RELATED STUDIES

The sub-section covers published and unpublished research works which are related to the study.

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According to Ramos (2015), it is necessary to highlight the significant findings from these researches that have similarities and differences to the on-going study.

The present or current and latest related studies are presented first, then following by those past ones (Ramos, 2015; Abad et al., 2014). Ensure to sub-headings are properly labelled as to guide the readers in the flow of the discussion.

Citing references in text should follow the 6<sup>th</sup> Edition of the Publication Manual of the American Psychological Association (APA, 2010) which can be retrieved from:

<http://lumenjournals.com/wp-content/uploads/2017/08/APA6thEdition.pdf>.

There are other existing online sources for proper citation and referencing as your guide such as follows:

[http://student.ucol.ac.nz/library/onlineresources/Documents/APA\\_Guide\\_2017.pdf](http://student.ucol.ac.nz/library/onlineresources/Documents/APA_Guide_2017.pdf)

[http://www.muhenberg.edu/library/reshelp/apa\\_example.pdf](http://www.muhenberg.edu/library/reshelp/apa_example.pdf)

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<https://aewintecsitefinity.blob.core.windows.net/sitefinity-storage/docs/default-source/study-at-wintec/apa.pdf>

REMEMBER ALWAYS! Be consistent that all cited in the text should be included in the reference list. Without quoting someone's ideas or words means that using others as your own is not allowed.

Finally, remember that:

- (a) Citation in text with one author, only the surname of the author is enclosed in parentheses (Ramos, 2018)



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(b) Citation in text with two authors, all surnames of the authors are enclosed in parentheses (Ramos and Perez, 2018)

(c) Citation in text with four or more authors, only the first author's surname is enclosed in parentheses (Ramos, et al., 2018)

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### CONCEPTUAL FRAMEWORK

This section explains both the theoretical and conceptual framework of the study. It gives a clear discussion regarding the research paradigm used in the conduct of the study. A typical model is the **INPUT-PROCESS (THROUGHPUT)-OUTPUT** which constitutes the flow of the activities, including the relationship of selected variables as shown in the figure below. A brief discussion for each process is required to have clearer understanding of the research methodology employed in the study.

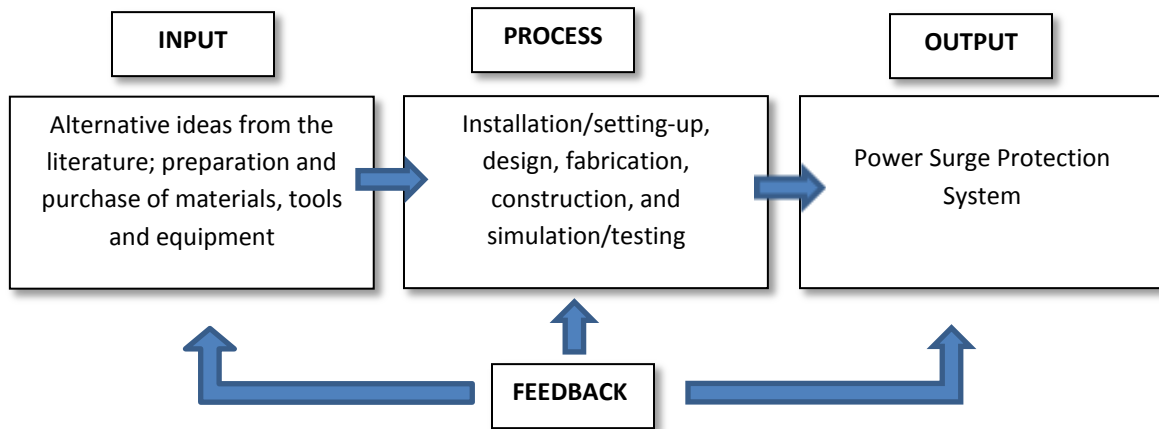


Figure 1. The Conceptual Framework

The conceptual framework can be presented using concepts, facts, variables and their relations that explain or predict how an observed phenomenon exists and operate as shown graphically shown below.

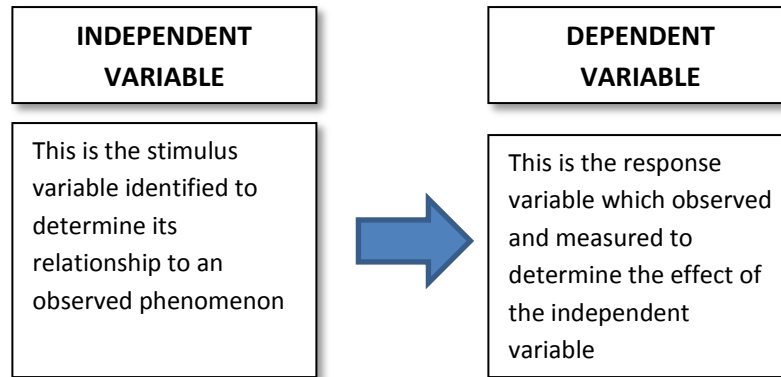


Figure 2. The Conceptual Framework

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### SYNTHESIS

This contains summary of the review of past studies that are relevant to the present conduct of the study. It is worth mentioning the methods, procedures, and framework adopted from the literature, and it contains relevant information with a strong connection or relevance to the study taken from the past studies.

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### DEFINITION OF TERMS

This is to enumerate the key terms used in the study and it is recommended to use the “operational term” in defining these key terms. It is operational term when it is based on an observed characteristic and how this term is used in the study.

**Bluetooth Emulator** – it enables Bluetooth communication from and to emulator.

**Pilferage** – the act of stealing electricity.



### HYPOTHESIS OF THE STUDY (IF APPLICABLE)

A hypothesis is formulated and temporarily adopted to explain the observed facts which guides in the conduct of the study, particularly on the kind of data or information to be collected.

This is normally used in experimental and descriptive researches. Some examples are as follows:

**Specific Problem 1:** *Is there a significant difference on the level of environmental awareness of the respondents across socio-economic and cultural variables?*

**Null Hypothesis:** *There is no significant difference on the level of environmental awareness of the respondents across socio-economic and cultural variables.*

**Specific Problem 2:** *Is there a correlation between socio-economic variables and level of environmental awareness among Mangyan Tagabukid high school students?*

**Null Hypothesis:** *There is no correlation between socio-economic variables and level of environmental awareness among Mangyan Tagabukid high school students.*

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### CHAPTER III

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#### RESEARCH METHODOLOGY

This chapter presents the methodology used in the study, including the materials and equipment or instruments used, selection of respondents and instruments (questionnaire, case study), and the overall procedures in the data collection and the statistical treatment of the data collected.

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#### RESEARCH MATERIALS

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This section covers the list of materials including the other components and formulations, and to be quantified. Technical specifications (if applicable) should be included with photos.

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#### RESEARCH EQUIPMENT

There is a need to identify the equipment and major instruments/devices and apparatus used in the conduct of the study. Brief description is also helpful to identify these equipment, including technical specifications.

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#### RESEARCH METHODS AND PROCEDURES

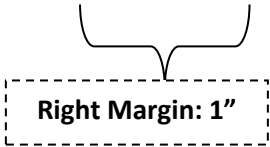
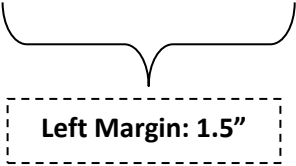
The section explains the comprehensive processes and stages in the preparation of the study. If applicable, flow chart and diagram must be presented to have a clearer understanding of the process and procedures. Adoption of testing procedures and standards should be clearly stated.

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**RESEARCH LOCALE AND TIME OF STUDY**

This section contains the area of the study. Brief discuss the coverage of the study and its duration. Location map and other locational requirements will be presented in this section.



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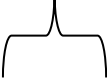
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**CHAPTER IV**

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**RESULT AND DISCUSSION**



This chapter presents the methodology used in the study, including the materials and equipment or instruments used, selection of respondents and instruments (questionnaire, case study), and the overall procedures in the data collection and the statistical treatment of the data collected.

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**RESULT OF THE EXPERIMENT**

This section should be presented in such a way that it will answer the objectives of the study. Sub-headings will correspond to the objectives. Only relevant data from the experiments and statistical data will be presented in this section by tables and graphs. Less important data will be included as Appendices.

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**FINANCIAL ANALYSIS (IF APPLICABLE)**

This section provides a detailed computation (itemized) and financial discussion of the study particularly for studies that deals with design, development, and simulation of equipment and devices.

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Table 1. Tables and figures should be valuable, relevant, and visually attractive.

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| Component |         |         |         |
| Total     |         |         |         |

Tables (title is placed on top) and figures (title is placed at the bottom) should be carefully explained in the text and cited in numerical order. Use basic colors in the figures, charts, and diagrams.

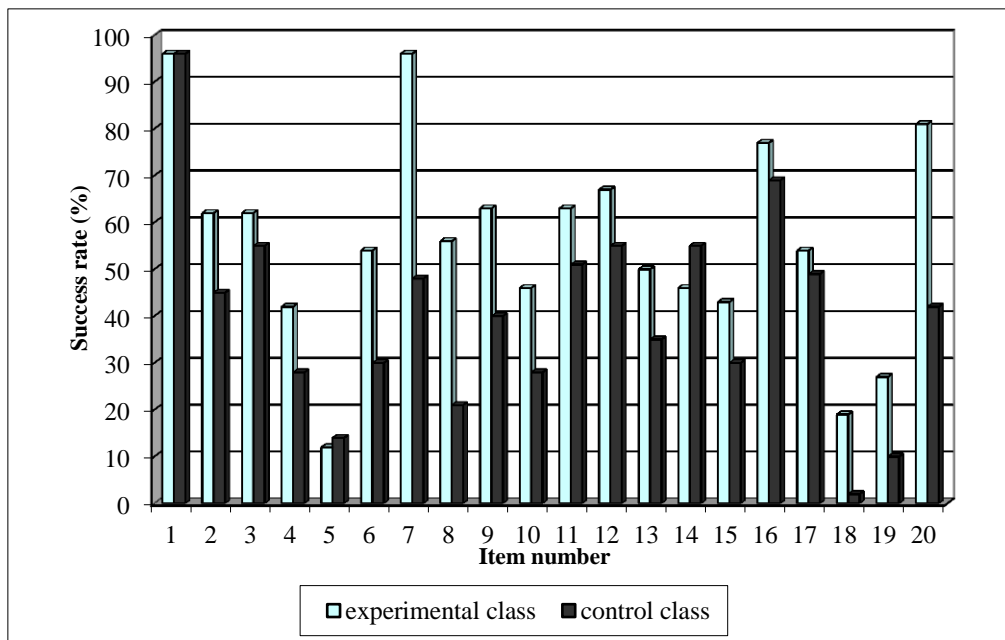


Figure 3: Comparison of success rate of items in the experimental and control class.

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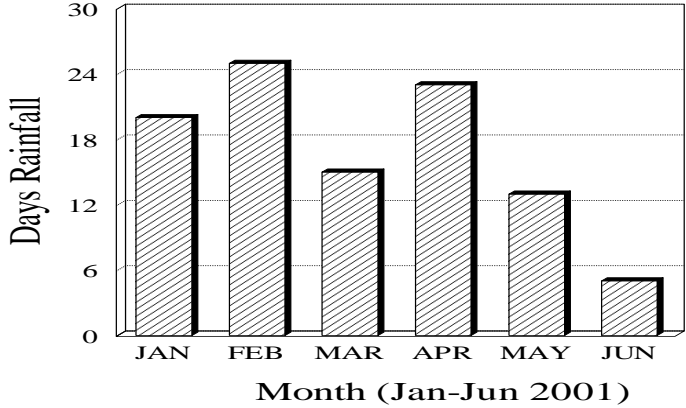


Figure 4: Clear line drawings are essential.

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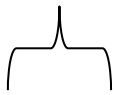
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## CHAPTER V

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### **SUMMARY, CONCLUSION AND RECOMMENDATION**

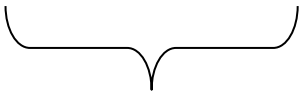


This chapter presents the important findings of the study. Findings should answer the research questions as stated in Chapter 1 or answering the research objectives. Please remember that summary, conclusion and recommendation must be consistent with each other.

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### **SUMMARY**



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This section summarizes the results based on the objectives or research questions of the study. In other words, it will highlight the summary of findings which answers each of the objective or research question.

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### **CONCLUSION**

This section fits together with the summary. For example, if there are three (3) objectives with the summary findings, then there will also be three conclusions. This section also contains the acceptance and rejection of the hypotheses (if applicable).

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### **RECOMMENDATION**

This section is based on the summary and conclusion. It contains suggested activities for future undertakings or further research related to the study.

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## REFERENCES

- Ramos, R. P. (2015). *Title of the Book*. City, Country: Publisher. (example citation from a book)
- Ramos, R. P. (2014). Title of the Article. *Name of the Journal*, Volume (Nos.), pages. (example citation of a journal)
- Ramos, R. P. (2016). Research Methodology. Retrieved from <http://www.bolender.com/action.htm> (example of citation from an online source)
- Castillo, F.S. (2007). *Research Education and Scientific Writing* (Latest Ed.). Manila, Philippines: Booklore Publishing Corporation (from a book with one author)
- Sha, A. S. (2011). *Research Methodology*. New Delhi, India: A P H Publishing Corporation (from a book with one author)
- Paler-Calmorin, L. & Calmorin M. A. (2007). *Research Methods and Thesis Writing*, (Second ed.). Manila, Philippines: Rex Printing Company, Inc. (from a book with two authors)
- Ramos, R. P. (2011). *Analysis of Mixed-use Schemes in Regeneration Areas*. Ph.D dissertation, Faculty of Art, Design and the Built Environment, University of Ulster (example of citation from PhD dissertation)
- Dela Vega, M., Gado, J. R., Galanga, C. M., Gaytano, G. F., Marcelo, E. S., Mayor, K. F., Mindoro, A. M., Morines, C. B., Motin, M. E., Overio, C S., & Teologo, R. G. (2016). *Bluetooth Application for Water Supply Control System*. Master thesis, College of Engineering and Technology, Romblon State University (example of citation from a Master's thesis)



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## APPENDICES

### APPENDIX A

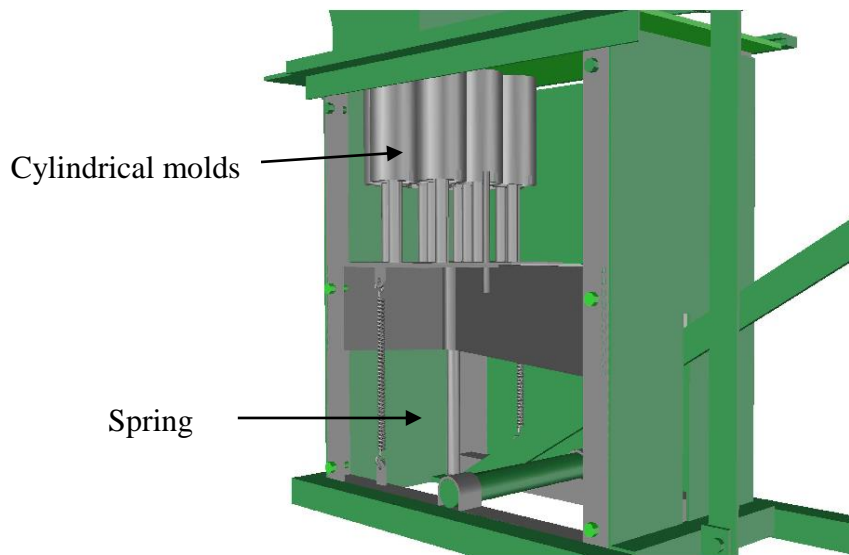
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Include photographs, figures, tables, diagrams, charts, test results, standard procedures, programming, plans and drawings, tabulations, computations, transmittal letters, statistical print-outs, survey forms, with proper captions or titles. It should be mentioned in the main report for easy cross-reference.

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#### BIOGRAPHICAL SKETCH

This includes a brief profile of the student researchers with clear 2x2 photo size, with signature specimen of the student.

#### CERTIFICATE OF ENGLISH CRITIC

A certification from an English teacher that the report is properly checked to meet University's technical writing standards.

**SIDE OF THE BINDED THESIS (RED COLOR)**

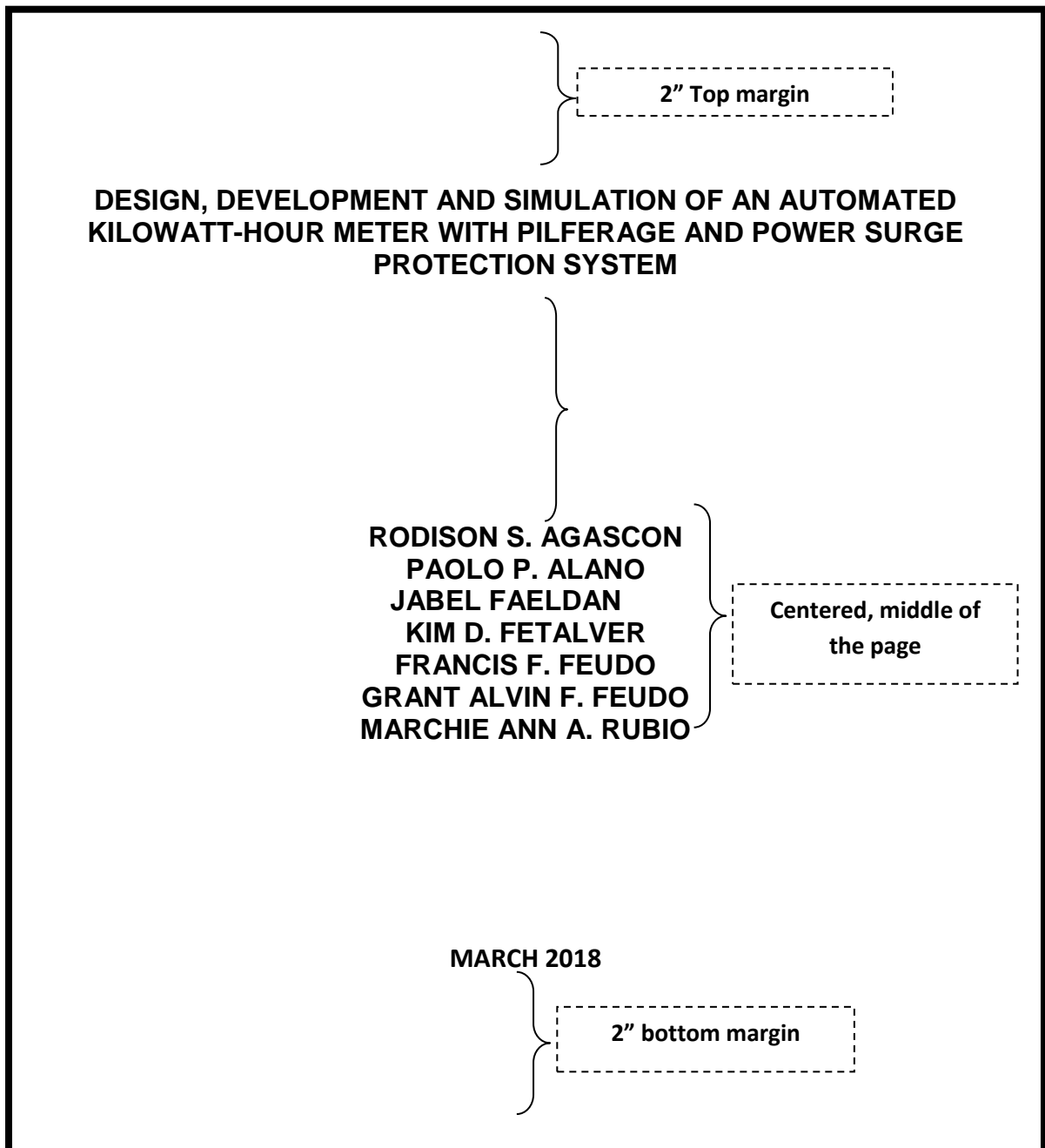
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THESIS BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING AGASCON, M. ET AL. MARCH 2018

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**FRONT COVER OF THE BINDED THESIS (RED COLOR)**

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**DESIGN, DEVELOPMENT AND SIMULATION OF AN AUTOMATED  
KILOWATT-HOUR METER WITH PILFERAGE AND POWER SURGE  
PROTECTION SYSTEM**

**RODISON AGASCON  
PAOLO P. ALANO  
JABEL FAELDAN  
KIM D. FETALVER  
FRANCIS F. FEUDO  
GRANT ALVIN F. FEUDO  
MARCHIE ANN A. RUBIO**

**MARCH 2018**

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