MACHAKOS UNIVERSITY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

Project Research Guide for Bachelor of Science in Computer Science and Information Technology

JULY, 2019

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WORD FROM PROJECT COORDINATOR

On behalf of Department of Computing and Information Technology my colleagues and I wish to extend our warm welcome to you as you embark on your undergraduate Research Project at Machakos University.

The department is responsible for training of Diploma and Undergraduate programs in Computer Science and Information Technology. Inherent in this training is a requirement for students undertaking these courses to conduct a project towards their successful completion of the program.

In this regard I introduce to you the Department of Computing and Information Technology ***Guide to Project Research.*** This guide provides students and supervisors a comprehensive information about the requirements of the research components of their undergraduate degree. It aims to:

- Clarify procedures required for the completion of the project research component of an undergraduate degree;
- Provide guidelines to students and their supervisors about how to successfully proceed through the system.

I hope that you will find the information in this guide useful. I welcome your comments and should you wish to ask more specific questions or seek clarification about any of the information provided please contact the Project Coordinator Department of Computing and Information Technology. I wish you all the best in your project research.

Project Coordinator

Department of Information Technology

Machakos University

1.0. Introduction

The project is a partial fulfillment of the Bachelor of Science degree offered in the department of Computing and Information Technology in Machakos University. The students are expected to write a well-articulated project paper in chapter format. Students will undertake this project paper during the final academic year (4^{th} year) and will be carried out in the two semesters of the academic year they registered

This guideline aims to provide students and supervisors with a guide on how to go about the various stages of doing the project. The main objectives of undergraduate project are as follows:

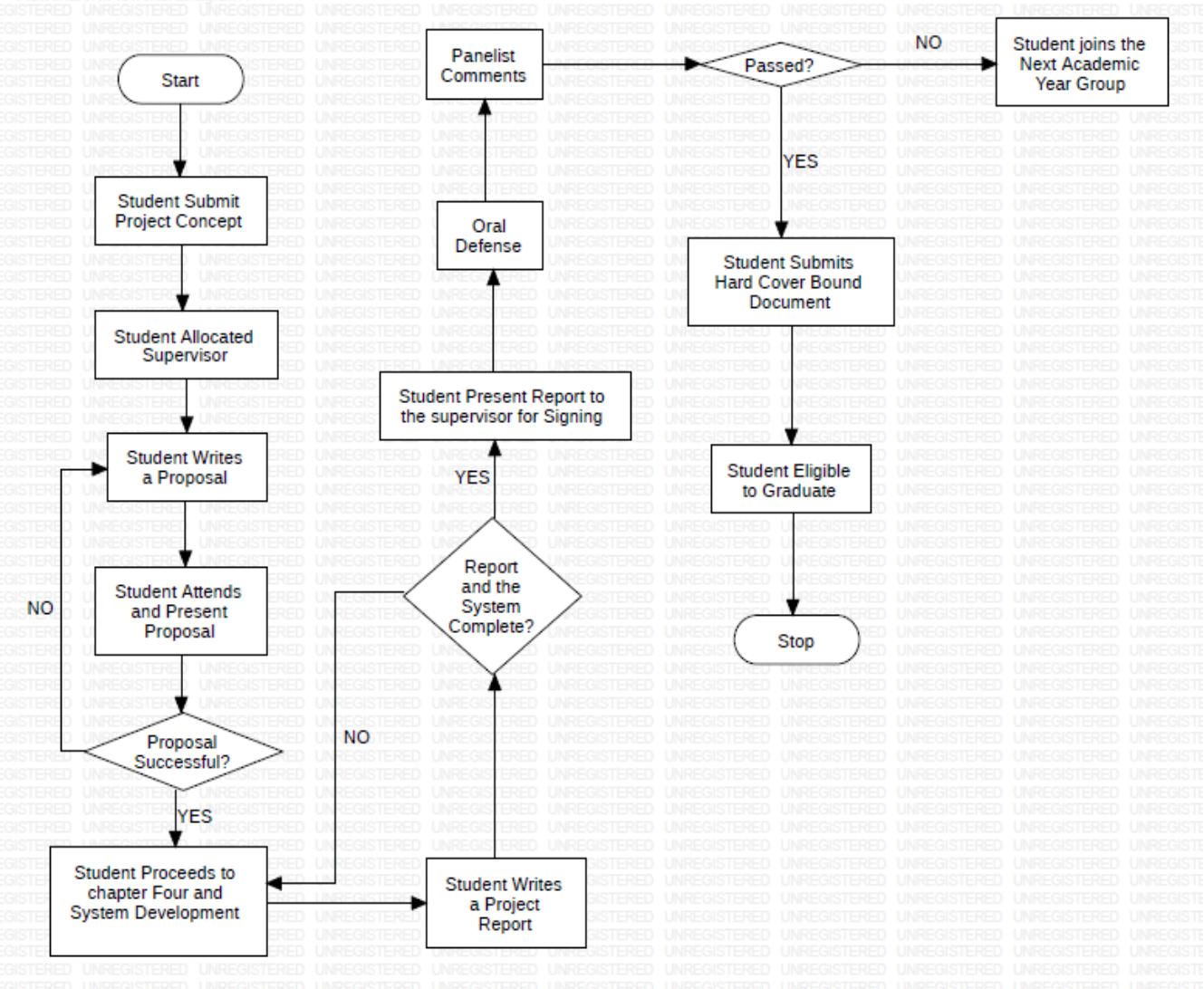
1. To provide students with the opportunity to integrate the knowledge and skills developed from Computer Science and Information Technology program.
2. To provide students with the independent study and to develop the ability to organize work with a view to achieve specific goal.
3. To provide students with the room to provide innovative ICT-based solutions to problems in the society and/or organizations.

The outcome of the project is an Information Management System, Mobile Application or a Robot built on the bedrock of computer technology. The project outcome should have the following qualities:

- Can be applied in the society
- Can be marketable

1.1. Process of Undergraduate Project

Figure 1 below show the process of conducting an undergraduate project.



**Eligibility to graduate is subject to successful completion of coursework and project but not project alone*

Figure 1: Project Process

NB: Students should keep in mind the duration allowable for each research output and ensure they can complete this process within the stipulated timeframe.

1.2. Project Topic/Title

A student is required to submit a probable project topic to the Project Coordinator. The project coordinator will assign supervisors to each registered student.

1.3. Appointing a Supervisor

The term *Supervisor* is used to denote a subject expert who provides supervision in the student's specialized field (Computer Science or Information Technology).
Upon receiving project topics from students, it is the prerogative of the Project Coordinator to assign each registered student (SIT 400 and SCS 400) a supervisor.

- Supervisors continue their supervisory responsibilities even when on leave

1.4. Project Concept/Description

Once given the confirmation on the project title and a supervisor assigned, students must immediately submit a copy of the approved project description and begin discussions with their respective supervisors on the first proposal draft report.

The description comprises a project title, description of the project, in terms of area it's to be carried out, the problem and solution (a maximum of one page). You should also include your contact (email and telephone number where applicable).

2.0. Supervision of Undergraduate Students

Supervision is a relationship requiring trust and respect. Students have the right to expect regular, high quality advice, support and direction in their quest for academic excellence.

2.1 Introduction

During the period of supervision from the time of allocation of supervisor until completion of all stages of the examination (including where necessary any resubmission) responsibilities and obligations are as set out below.

2.2. Responsibilities of the Supervisor

The responsibilities of supervisors are:

a) Give guidance about the nature of research and the standard expected, the planning of the research program, relevant literature and sources and research methods.
b) Assist in the arrangement of necessary administrative steps such as approval of research proposal, research seminars, completion of progress reports, etc.
c) Maintain contact through regular personal supervision and seminar meetings in accordance with School policy and in the light of any agreement reached with the

student. The frequency and nature of these sessions will vary depending on the nature of the research, and the requirements of the discipline.

d) The Supervisor should make provision for the continuance of supervision when he or she is away from the University or takes a period of leave. The Supervisor is responsible for maintaining a record of all supervision with the student.
e) Give detailed advice on the necessary completion dates of successive stages of research in order to ensure that the research work is submitted within the time allowed by the regulations.
f) Hold monthly meetings between the student and supervisor at which progression is discussed and a written note recorded. The records of these monthly meetings remain with the student and supervisor.
g) Request written work as appropriate and return such work with constructive feedback within an agreed period of time.
h) Keep in contact with the student and respond to reasonable requests for assistance. The Supervisor should provide guidance on the writing and preparation of the research work, including commenting on the drafts. The Supervisor is not expected, however, to undertake substantial editing or revision of a draft project. Ultimately, the Student is responsible for his or her work and the Supervisor's responsibility is to give guidance.
i) Sign off on the submitted research work prior to examination. No research work should be submitted for examination without the signature of the supervisor.
j) Ensure that the Student is prepared for the oral examination and understands its role in the overall examination process.
k) Advise the Student subsequently of the implications of any recommendations from the examiners and assist in the preparation of any re-submission.

2.3. Change of Supervisor

Problems may arise in the course of study between the student and supervisor. In such cases it is recommended that the matter is discussed with the Project Coordinator and a solution is sought. If the problem persists and is hindering the progress of the student, the student may formally write to the Chairman of the Department requesting change of supervisor and stating the reasons for the change.

Change of supervisors may also occur when a Supervisor leaves the University.

Any change of supervisor or request for an additional supervisor must be approved by Project Coordinator or the Chairman of the Department.

2.4. Responsibilities of Candidate/Student

Supervisors have the right to expect a high level of commitment from their candidates who should respond positively to advice and guidance and will develop an increasing level of independence in the conduct of their project.

The responsibilities of the Candidate include:

a) Plan and discuss with the Supervisor the project topic and timetable for the project.
b) Discuss and agree on a schedule of meetings and appropriate feedback.
c) Undertake study as required by the Supervisor which may include directed reading or specialized seminars as required.
d) Raise problems or difficulties with their Supervisor, no matter how trivial they seem, and in particular inform their Supervisor of any personal circumstances which prevent them from working on their project.
e) Maintain progress according to the agreed schedule, in particular including the presentation of written material in time to allow for discussion and comment before proceeding to the next stage of project.
f) Take note of, and respond to feedback and guidance from the Supervisor.
g) Keep systematic records of work completed.
h) Write up and submit the project within time and in accordance with the Department's guidelines for the submission of project.
i) Take advantage of any relevant skills training offered by the Department including preparation for an oral examination, and academic writing.
j) Take responsibility for producing the final copies of the project, its content, and ensuring that it is in accord with the relevant requirements, including the standard of presentation.\

3.0. Writing Project Proposal

This is the next stage after the approval and assigning of the supervisor. When considering the project proposal, students should look for a critical and analytical approach to the following:

a) Specification of the goals of the project
b) Outline of strategy and methodology for achieving goals
c) Literature references with comments as to their relevance
d) Understanding of the basic principles underlying the project
e) Foreseeable problems and strategies for resolving them.

3.1. Format of Project Proposal

a) Length of Proposal

i. In accordance with these guidelines and the subject area of study, a project proposal for an undergraduate research shall not normally exceed 10-15 pages.

ii. The above maximum is exclusive of footnotes, list of references, appendices, table of contents and timeline.

b) Content of Proposal

Different disciplines may have specific requirements for project proposals. However, the general flow of the proposal should be maintained. The project proposal should contain (but not be limited to) the following sections:

Chapter 1: Introduction

1.1 Introduction- this should be between a minimum of 2 and Maximum of 3 pages.

1.2 Background of the Study- is a minimum of ½ page and maximum of 1 page.

1.3 Problem Statement- It should be stated in paragraph form.

1.4 Research Objectives- only project objectives should be included and which should be SMART (S – Specific, M- Measurable, A- Achievable, R- Realistic/Relevant, T- Time bound/boxed. The supervisor should guide the student on the minimum and maximum number of objectives as per his/her project. Key words like Investigate, develop and analyze should be used to list objectives.

1.5 Scope and Limitation of the study- student should come clearly on how much he intends to cover in his/her project and why the much.

1.6 Justification of the Study- student should justify their project by indicating the interestingness and challenge that the project presents, the timeliness of the idea, the possible advantages that realization of such a project would bring.

Chapter 2: Literature Review

In this section, the student should organize their argument so as to:

(i) Examine the most current studies on the topic, presenting only the significant aspects of these studies.
(ii) Compare and contrast different authors' views on the topic under discussion.
(iii) Highlight any gaps in research in line with the topic under discussion.
(iv) Conclude by summarizing what the literature says. From here the link between previous studies and the proposed project is developed, showing the knowledge gap that the proposed project will contribute to.
(v) Develop a conceptual framework, identify and define the variables of the study.

Chapter 3: Research Methodology

3.1. The Research Design

3.2. Population and sampling

3.3. Data Collection Methods

3.4. Data analysis

c) References

This section contains a list of sources you have referred to when writing your proposal. This is an act of acknowledging the author of the resource.

APA 6th Edition referencing style should be used. Visit the following site for more details www2.eit.ac.nz/library/ls_guides_apareferencing.html.

d) Appendices

Material that is pertinent but is somewhat tangential (e.g., budget, project schedule, questionnaires, interview guides, letters of introduction) or very detailed raw data, procedural explanations, etc. may be placed in an appendix. Appendices should be designated A, B, C or I, II, III. If there is only one appendix, call it simply Appendix, not Appendix A. Titles of appendices must be listed in the table of contents. The page numbering of the Appendices must be consecutive from the text of the project (do **not** number the pages A-1, A-2, etc.).

For example: Appendix A: Sample Questionnaire or Appendix I: Sample Questionnaire or Appendix 1: Sample Questionnaire.

3.2. Presentation and Arrangement of Proposal

i. ***Paper***: International A4 (210mm x 297mm) within range 70 g/m2 to 100 g/m2. No restrictions are placed on the size of the drawings, maps or similar material, which should be bound in with the proposal

ii. ***Margins****:* 40mm on the left-hand side, 25mm on the right-hand side, top and bottom margins.

iii. ***Typing****:* On one side of the paper only. One-and-a-half (1.5) spacing should be used in typescript except for indented quotations or footnotes, for which single (1.0) spacing may be used. Font size 11 or 12 should be used, and an appropriate font type selected (Times New Roman, Book Antiqua, Arial or Helvetica).

iv. ***Numbering of Pages****:* All pages, including abstract, appendices, drawings, maps, pages of photographs, etc, should be numbered consecutively in one sequence. Preliminary pages should be numbered using Roman numerals, while Arabic numbering should be used for pages from Chapter 1 onwards. Numbering should be placed at the bottom of the page and aligned at the center. There should be no running headers and footers.

v. ***Sequence****:* Material should be arranged in the following sequence:

- **Title Page**, with the title of the research, course of study, name and number of student, name of university and date.

- Author's **declaration** (being a statement that it is the author's individual contribution, not submitted for a degree award anywhere)
- Table of Contents
- List of Tables, Figures, etc (if any)
- List of Abbreviations (if any)
- Text (divided into chapters, sections, etc)
- Chapter 1: Introduction
- Chapter 2: Literature Review (depending on the work, this could be more than one chapter)
- Chapter 3: Research Methodology
- List of References
- Appendices (if any)

3.3. Project Proposal Evaluation Process

(i) The proposal evaluation is conducted at the Departmental Level in which the student is registered.

(ii) The Project Coordinator shall appoint a panel comprising of at least three qualified members of department academic staff to evaluate the research proposal. The panel should include the Supervisor of the student whose proposal is being evaluated. One of the panelists shall chair the session.

(iii) The student in question is required to make an oral presentation of the research proposal before the panel and be interviewed by the panel. The defense session should take no more than 25 minutes.

(iv) The panel is required to evaluate and assess the research proposal and to satisfy itself that the proposal can provide a viable framework for conducting an undergraduate project that would make contribution to innovation, knowledge and creativity.

(v) Once the panel recommends that the proposal is adequate for an undergraduate project, the student embarks to undertake the study.

3.4. Criteria for Assessing Project Proposal

a) The panel shall use the following criteria to assess the suitability of the research proposal in relation to the degree for which the student is enrolled:

(i) Clearly defined Problem statement

(ii) Appropriate proposed solution

(iii) SMART Objectives

(iv) Innovativeness of the project

(v) Ability of the student to communicate the ideas in the project clearly

(vi) Other relevant criteria suggested by the department

The marks distribution shall be guided by the above criteria as follows:

No	**Criteria**	**Points**
1	Clearly defined problem statement	6 Points
2	Appropriate proposed solution	6 Points
3	SMART objectives	6 Points
4	Innovativeness of the solution to the problem	6 Points
5	Ability of student to communicate (Oral) project ideas	6 Points
6	Correct formatting and content of the proposal documentation	10 Points
	TOTAL	**40 POINTS**

b) The panel may make any one of the following recommendations:

(i) Approve the proposal

(ii) Approve the proposal subject to amendments

(iii) Reject the proposal

c) If the proposal is endorsed, the student embarks to undertake the study.

d) If the proposal is rejected, the student is given one more opportunity to resubmit. If the proposal is still rejected, the student will be advised that their progress is unsatisfactory and will be advised about other options.

3.5. Other Sections of the Project Document/Report

CHAPTER 4: SYSTEM ANALYSIS AND DESIGN

This chapter is based on analysis of collected data which informs the system design and architecture.

This chapter includes the following subsection.

4.1. Data Analysis Results

In this section results from interviews, questionnaires, review of previous records and any other method used to collect data. These findings will be used to design the proposed system.

4.2. Requirement Analysis

In this section both functional and nonfunctional requirements are discussed in line with the project under development.

4.2.1 Functional Requirements

Functional requirements are functions, processes and capabilities that the system has to perform and execute if it is implemented. These functions are in relation to goals that the user wants fulfilled by the system.

4.2.2. Nonfunctional Requirements

Non-functional requirements are behavioral properties that the system must have such as performance and usability. In addition, non-functional requirements are qualities that a system can do without but are desired to make the system interactive, user friendly, and easy to use.

4.3. Analysis of the Current System

In this section you describe the current system by using DFDs, Sequence diagram, etc.

4.4. Propose System Architecture

In this section discuss the architecture of the proposed system.

4.5. System Use Case

Draw use case diagrams in relation to the system under development.

4.6. System Sequence Diagram

This section shows the interaction between actors and the system. The actors are identified in the use case diagram.

4.7. Data Flow Diagram

This shows how data flows within the system. Data bases schemas are drawn in this section.

4.8 Physical Design

This shows the database design of the system under development clearly showing the tables and their relationship.

4.6. Entity Relationship Diagram

This shows the relationship between objects or domain or concepts of the system under development. The relationship could be One-to-one, one-to-many, many-to-many etc. for example one student can borrow one or more books in the library.

CHAPTER 5: IMPLEMENTATION AND TESTING

5.1. Introduction

The aim of this section is to discuss tools used in the development of the system, testing of the system and proposed system changeover.

5.2. Development Tools

In this section tools used to develop the system are discussed briefly. For example programming language used, Database Management system (MySQL), Script Editor (Dream weaver) etc.

5.3. Testing

Testing: this should be explained in terms of the data used to test and the approach. Testing results should be discussed.

5.4. Proposed Changeover Strategy

Once the system is tested, the proposed change over strategy is discussed. For example, direct, phased, parallel changeover method can be discussed depending on the suitability of your project.

CHAPTER 6: DISCUSSION, RECOMMENDATION AND CONCLUSION

6.1. Introduction

Introduction of the chapter.

6.2. Discussion

Discuss the findings of the research in relation to the objectives of the project.

6.2. Recommendation

Make a recommendation of the adoption of the system to enable solve the problem at hand.

6.3. Future Work

Suggest future work that can be done in order to improve on areas that you have not covered.

6.4. Conclusion

Make a general conclusion of the entire document. The conclusion should include the problem and the solution and the contribution of the research as far as system solution is concerned.

4.0. Writing Project Document/Report

Upon the supervisors' approval of the detailed project proposal, the students should proceed and prepare their project paper under the supervisor's guidance**;** the document should

- be written in past tense
- have a minimum of 35 and maximum of 60 pages of the main document

4.1. Organization of Project Report/Documentation

The Project paper should consist of three main parts;

- The preliminary pages or front end
- The text or main body, usually divided into parts – chapters and sections
- The supplementary pages or back end.

4.2. Front Matter

The term "front matter" refers to all the pages in front of the main text of the project. Front matter pages are numbered with lower case Roman numerals. These pages are:

- Title page (unnumbered)

- Declaration by candidate, and approval of project (page ii)
- Abstract (begins on page iii)
- Table of contents
- Lists of figures, abbreviations, maps, tables or other illustrations (each a separate list)
- Acknowledgments
- Dedication (optional)

The sequencing of the front matter pages should be as shown above.

The abstract is required in all project and begins on page iii. The table of contents and acknowledgments are also required. Dedication is optional and should be at the end of the front matter. Chapter 1 then begins on Page 1.

Title Page

It must appear as shown below. Type the title of the project using Title Case throughout. Use your legal name as it appears on your student record. Your name must appear in exactly the same form each time it is used in the project. On the date line, indicate the month and year of degree conferral, not the date of the defense or the date you submit your project. On the spine a shortened title, surname and initials of candidate, the degree for which the work was submitted and the year of submission should appear.

SAMPLE OF PROJECT TITLE PAGE

MACHAKOS UNIVERISTY

SCHOOL OF COMPUTING ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOHY

[TITLE]

[NAME OF CANDIDATE]

[STUDENT NUMBER]

Project Report Submitted in Partial fulfilment of the requirements for the Degree of [name of program….]

[Month, Year]

Declaration and Approval

The declaration and approval page appears immediately after the title page and should

appear as below:

Declaration

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the project contains no material previously published or written by another person except where due reference is made in the project itself.

[Name of Candidate]
[Signature]
[Date]

Approval
The project of [*Name of Candidate*] was reviewed and approved* (*for examination*)** by the following:

[Name of Supervisor]
[Department]
[Institution]

i. Abstract

Every project must contain an abstract. An abstract is a concise summary of the project, intended to inform prospective readers about its content. It usually includes a brief description of the research, the procedures or methods, and the results or conclusions.

An abstract should not include internal headings, parenthetical citations of items listed in the reference section, diagrams, or other illustrations.

The abstract follows the declaration/approval page and begins on page iii. The abstract should normally not exceed 250 words.

ii. Table of Contents

The Table of Contents is essentially a topic outline of the project. It is compiled by listing the headings in the project. You may choose to include first-level headings, first- and second-levels,

or all levels. Keep in mind that a fairly detailed table of contents serves as a useful guide for the reader. The table of contents must appear immediately after the abstract and should list everything in the project, except, the table of contents itself.
Be sure that the headings listed in the table of contents match word-for-word the headings in the text. Double check to be sure that correct page numbers are shown. In listing appendices, indicate the title of each appendix.

iii. List of Figures, Tables and other Illustrations

Include a list of figures (illustrations) and a list of tables if you have one or more items in these categories. Use a separate page for each list. Show the caption and page number of every figure and table in the project. Also include lists for abbreviations, nomenclature, maps, etc.

iv. Acknowledgments

An acknowledgments page is required to recognize those that the author has interacted with in the course of the research, including respondents of the research, readers, editors, copy typists, etc. It is used to express the author's professional and personal indebtedness.

v. Dedication (optional)

Some authors include a statement of dedication as the last page of the front matter. A quotation (epigraph) may also be included in this page. The source of an epigraph is indicated below the quotation but need not be included in the list of references.

4.3. Body of Project

The body of the project should be divided into chapters, sections, etc as below:

- Chapter 1: Introduction
- Chapter 2: Literature Review
- Chapter 3: Research Methodology
- Chapter 4: System Analysis and Design
- Chapter 5: Implementation and Testing
- Chapter 6: Conclusion and Recommendations

You may have up to Level 4 heading if desired. However, levels 1 to 3 are usually adequate. Ensure you number the levels correctly.
Please note that depending on the work, some aspects such as literature review or findings may have more than one chapter. This is allowable. However, the overall order of the project should be maintained.

1. TABLES AND FIGURES

A **table** is a columnar arrangement of information, often numbers, organized to save space and convey relationships at a glance. A rule of thumb to use in deciding whether given materials are tables or figures is that tables can be typed, but figures must be drawn or scanned from a source.
A **figure** is a graphic illustration such as a chart, graph, diagram, map, or photograph.

i. Captions and Numbering

Each table and each figure in the text must have a number and caption. Number them consecutively throughout by chapter using a decimal system. For example, the first table appearing in chapter 1 will be Table 1.1, and the first table in Chapter 2 will be Table 2.1. The

first figure in Chapter 1 will be Figure 1.1 and the first figure in Chapter 2 will be Figure 2.1. Each table or figure number must be followed by a caption that briefly explains it.

ii. Placement of Tables and Figures

It is best to place a table or figure immediately after the first mention of it in the text— on the same page if there is room, or on the following page. Tables and/or figures MUST NOT be grouped together at the end of the chapter or project. Only tables or figures of peripheral importance to the text may be placed in an appendix. Tables and figures must be referred to in the text by number, for example, 'Table 4.1 below…' and not by a phrase such as "the following table", or "the table below."

iii. Sources

If a figure or table is taken from another source, indicate the source at the bottom right hand side of the figure or table beginning with the word: "Source.." The source must include the page number from which the illustration was taken. Source notes are not numbered, even if there are other numbered notes. If a figure or table is copied from its source, be sure it is large enough to be readable.

4.4. Back Matter

The back matter (or end matter) of the project includes the following items:

- list of references
- appendices (***must come after the references***)

List of References

A project must include a list of references section listing all works which are referred to in the text. This section must appear before the appendices (if any). The APA style of referencing is to be used for all theses and dissertations.

Appendices

Material that is pertinent but is somewhat tangential (e.g., questionnaires, interview guides, letters of introduction) or very detailed raw data, procedural explanations, etc., may be placed in an appendix. Appendices should be designated A, B, C or I, II, III. If there is only one appendix, call it simply Appendix, not Appendix A. Titles of appendices must be listed in the table of contents. The page numbering of the Appendices must be consecutive from the text of the project (do **not** number the pages A-1, A-2, etc.).

5.0. Project Oral Presentation

Once the student has coded the system and prepared a project documentation, the supervisor shall ensure that all requirements are met before signing the document for submission for oral presentation. The student is required to always consult the supervisor and the guide to ensure that the document is prepared well to meet the standard.

Upon clearance by the supervisor, students will be invited for an oral project presentation. The presentation panel will be constituted by the Project Coordinator. The panel will consist of at

least 3 staff members where one of them will be the supervisor of the student defending the project.

After system demonstration, each panelist will be required to mark read the documentation thoroughly and make comments on the document for the student to address them. In addition the panelist will award documentation marks on a separate evaluation form.

NB: No student will be allowed to present without having submitted a signed project document from the supervisor.

5.1. Panelist Comments

After presentation the panel can give one of the following verdict:

i. Passed
ii. Passed with corrections
iii. Fail

- If the verdict is pass, then the student proceeds to prepare a hard cover bound document and subsequently submit it to the project coordinator.
- If the verdict id passed with corrections, the student must do the corrections and be supervised to ensure he or she does them correctly. After confirmation of correct document, by the supervisor, the student proceeds to binding a hard cover document.
- If the verdict is fail, the student will be given a second chance to redo the project and join the continuing group in the next academic year.

5.2. Submission of Hard Cover Bound Document

During submission of the hardcover bound document the student should attach the soft copy of the system in a Compact Disk together with TWO hardcover documents to the project coordinator.

Upon meeting these guidelines the student will be eligible for graduation. However, the student must have completed all other coursework units successfully.