UNIVERSITY OF THE WITWATERSRAND
JOHANNESBURG

FACULTY OF SCIENCE

Style Guide for Theses, Dissertations and Research Reports

Style Guide for Theses, Dissertations and Research Reports

CONTENTS

1. INTRODUCTION

This guide is intended for postgraduates who are preparing to submit their Theses, Dissertation or Research Report for examination. The intention is to provide a concise guide covering all aspects of the required document. It does not, however, aim to provide comprehensive information on detailed stylistic features. There are in addition usages which are specific to each of the many subject areas falling under the control of the Faculty of Science. Candidates should therefore consult their supervisors about the specific requirements of their topic and discipline.

It should be noted that the terms Theses, Dissertation and Research Report have specific meanings: a 'Theses' is the document submitted for the degree of Doctor of Philosophy; a 'Dissertation' that for the degree of Master of Science by research only, and a 'Research Report' that for the degree of Master of Science by Coursework and Research Report. The Research Report should take the form of a 'mini' Dissertation.

The word 'Theses' is used in this document for simplicity, but the information given applies to Theses, Dissertations and Research Reports.

2 THE STRUCTURE AND FORM OF THESES, DISSERTATIONS AND RESEARCH REPORTS

This chapter does not aim to provide comprehensive information on all matters relating to form and structure in Theses writing.

2.1 The structure and form of theses - preliminaries

The essential elements of the Theses are presented below in the order in which they should normally appear.

Title and Title page
Candidate's Declaration (Signed)
Abstract
Dedication
Acknowledgements
Contents
List of Figures
List of Tables
List of Symbols
Nomenclature
Introductory Chapter
Central Chapters
Concluding Chapter
References
Bibliography
Appendices

2.1.1 Title and title page

A specimen title page is shown in Appendix A. The following information is given on the title page.

Title:
The title should indicate the contents and scope of the Theses in as few words as possible. Phrases like 'a report on investigations into….' And 'observations on some aspects of ' Add nothing significant to the title and should be avoided. While the title should be as brief as possible it should be accurate, descriptive and comprehensive, clearly indicating the subject of the investigation. It is most important in the view of the Higher Degrees Committee that titles of Theses are fully relevant to the contents of the work to avoid misunderstandings at the time of examination.

The title is best typed in capitals, with a space between each letter and three spaces between words.

Author's Name:
The full forenames followed by surname are usually given under the title. They should be typed with the first letter of each name in capital letters and the remainder in lower case.

Thesis Statement:
The following are examples of appropriate wording.

Degree of Doctor of Philosophy:

'A Thesis submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy.'

Degree of Master of Science by research only:

'A Dissertation submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science.'

Degree of Master of Science by coursework and research:

'A Research Report submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science.'

Year when the Theses was completed:
This lowest line should be no more than 25mm from the foot of the page, and should include the place and date of completion of the Theses, i.e. signed on 28 April 2010 in Johannesburg.

2.1.2 Candidate's declaration

University regulation G.28 specifies the following:

'A candidate shall submit a formal declaration stating whether the Thesis is his/her own unaided work, or if assisted, what assistance he/she has received.'

An example of the conventional form of declaration is as follows:

DECLARATION

I declare that this Theses* is my own, unaided work. It is being submitted for the Degree of Doctor of Philosophy** at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

_____

(Signature of candidate)

_____day of _____20_____in_____

* Dissertation or Research Report as applicable

** or Master of Science as applicable.

This declaration should appear on a separate page and each copy of the Theses should be individually signed by the candidate.

2.1.3 Abstract

The abstract is a brief informative summary of not more than 150 words for a master's Dissertation or Research Report and not more than 350 words for a doctoral Theses. It outlines the purpose of the Theses, the research methods and procedure employed, as well as the major results and conclusions. The abstract should always start with a topic sentence that is a central statement of the major theme of the Theses.

The abstract is extremely important. It should give as concisely as possible the significant facts, especially anything new, the main conclusions and any recommendations. The reader can then decide whether or not he/she is interested in reading further. An abstract should be written in normal and not telegraphic style. (See section 8.2 on the University's requirements for abstracts.)

2.1.4 Dedication

This is a brief, optional statement paying tribute to the writer's wife, family, or other associated person. It is typed centrally on a separate page starting on the chapter line and does not require a heading, e.g.

In memory of my mother

Ruby Johnson

1896 – 1975

2.1.5 Acknowledgements

Assistance received in carrying out the work in preparing a Theses should be acknowledged, although it is not usual to acknowledge routine checking, minor assistance or general advice. It is, however, usual to acknowledge financial assistance, permission to publish, as well as special facilities provided by a company, university or research institution.

2.1.6 Contents

The contents should be given on a separate sheet and follow the plan of the structure of the Theses (Section 2.1 above) and the headings in the Theses itself. The contents should only contain the first three levels of headings in the Theses. It must also include the relevant page numbers. (A specimen contents page is shown in Appendix B.)

2.1.7 List of figures

A list of figures follows the contents on a new page, and precedes a list of tables. (A specimen list of figures is shown in Appendix C.)

2.1.8 List of tables

A list of tables follows the list of figures on a new page. (A specimen list of tables is shown in Appendix D.)

2.1.9 List of symbols

Each Thesis should provide a list detailing the symbols for physical quantities used. These symbols vary from discipline to discipline and candidates should consult their supervisors with regard to the correct symbols for their field of research.

2.1.10 Nomenclature

Authors should avoid jargon and abbreviations which are not in common use in the field or which have not been defined. If there are acronyms or unusual technical terms, these should be defined in alphabetical order in a table or listed. If there are only a few they may be defined when they first occur in the text.

2.2 Body of the thesis

In most theses the chapters may readily be divided into three categories: the introductory chapter or chapters; the central chapters comprising the major report of the study, divided into logical chapter divisions (publishable/ published manuscripts); and the concluding chapter or chapters, which should contain the findings, conclusions and recommendations of the report.

2.2.1 Introductory chapter(s)

The first chapter, or chapters, should contain the following items:

- A clear and complete statement of the problem investigated, the hypotheses tested or the purpose of the study
- A validation or justification of the problem, which by a discussion of discriminatingly selected reasons, establishes the importance of the problem. It is often appropriate, at this point to indicate the limitations of the undertaking and to define words unique to the study or used in a restricted or unusual manner in reporting the investigation.
- A preview of the organisation of the thesis. This will make it easy for the reader to see at a glance the relationship between the various parts of the work.
- A résumé of the history and present status of the problem by means of a literature survey comprising a brief critical review of previous investigations of this and closely related problems. The contribution of these to the question as a whole should be made clear, together with the fact that the investigation arises from fallacies, inadequacies or inaccuracies of earlier studies.
- A statement of the sources of data, the method of procedure (experimental techniques) and the treatment of the findings. In a classic thesis of an experimental nature, a separate chapter (Materials and Methods) is ordinarily devoted to these topics.

2.2.2 Central chapters

It is impossible to give specific directions for organising the findings of all studies, because of the wide variety of topics investigated, techniques employed, and kinds of data accumulated. Suffice it to say that the chapters of this portion of the thesis are the thesis – they are the candidate's contribution to knowledge. All other portions of the thesis are subordinate to what actually has been discovered and is being made known in the thesis. The candidate should, therefore, take great pains to present his/her material in a clear and orderly fashion, in terms that will be readily understood.

The organisation and distribution of content should be such that each chapter represents an important division of the subject investigated and reported. Each chapter, other than the introductory and final chapters, can be considered as standalone scientific manuscripts. As such they comprise:

- A contextualised introduction which also provides a statement of the portion of the overall problem
- A description of the materials and methods used in connection with this part of the overall investigation
- A description of the collected data
- A discussion contextualising the information with the published literature
- A concluding section/summary indicating the contribution of the findings.

Thus in many cases the central chapters represent a series of publications. Indeed this format is often referred to as a 'Thesis by Publication' (see 2.2.5).

NB For PhD candidates at least one publication must be submitted to a peer-reviewed journal prior to submission of the thesis for examination.

2.2.3 Concluding chapter(s)

The concluding chapter, or chapters, should be a summary, restating the developments of the previous chapters and showing succinctly the more important findings and conclusions of the whole study. It is here that the author is showing how the findings fit into what are known about the topic and how they are advancing understanding of the topic. Obviously the summary sections/ conclusions of each of the central chapters/ publications form the basis of this concluding chapter. The author may also list unanswered questions that can be the basis of future studies. It is not unusual that synthesis of the introductory chapter and concluding chapter result in a review (or mini review) manuscript for publication.

1.2.4 Appendices

Appendices are convenient places for recording complicated mathematical or other formulae, descriptions of experiments or apparatus, and any other specialised or lengthy material such as computer programme listings, copies of spectra or other instrumental outputs that would otherwise detract from the readability of the text. The reader should be able to study or refer to these later, and only if he/she wishes to do so, after he/she has read the main work. Appendices must be numbered or lettered consecutively in large print at the top right-hand corner of the page to facilitate their location in the text. Each appendix must start on a new page. The appendices should be placed immediately before the list of references.

2.2.5 Variations in thesis structure

As previously mentioned a PhD thesis can be submitted for examination in 'classic' format or via 'publication'. It is important to realise that there is acceptable variation between these two styles. For

example a PhD may be submitted for examination with 1 or 2 papers already published and a few other chapters that will form the basis for future publications (i.e. after/during examination). Other than the Faculty's basic rule that at least 1 manuscript has been submitted for peer review before examination these variations in the PhD structure are acceptable and can be submitted for examination. The ultimate number of publications that emanate from a PhD will vary depending on the subject matter and the broader area of study. Students are encouraged to discuss the research outputs from the PhD with their supervisor(s) from the start of their registration.
If a thesis which includes publications is to be submitted for examination there are a few points that should be taken into consideration whilst preparing the thesis:
Any PhD must make (through research work) an original (novel) and significant contribution to knowledge in the chosen field. Thus the thesis should contextualise the research in an overarching introduction, critically set the collected data in the context of existing literature and should evaluate the contribution that the research makes to the advancement of the research area. A thesis which involves a series of publications must clearly do the same. However, this demands taking to account the fact that each published paper has its own introduction, methodology, results and discussion sections.

It is therefore highly likely that there will be repetition of information in a thesis that includes publications. It is important to try to keep this to a minimum. This could be achieved for instance by reducing information in the contextualising introduction and presenting it in the introduction of the paper/chapter.

The writing of the concluding chapter for the thesis is made easier by the fact that each published paper has a conclusion. However, whilst drawing the publications/chapters together and critically appraising them in the coherent and synthesising concluding section of the thesis it is important to remember to demonstrate how all of the research is advancing understanding in the field of study.

In the case of multi-authored papers it is essential that the role played by each author is highlighted in an unambiguous statement. This statement can be placed at the start or end of the chapter/publication in the thesis and should include the details of the publication viz. title, journal name, page numbers, impact factor and must also allocate a percentage involvement of each author and describe their actual contribution. For example:

Tshabalala, T., Simatale, P. and Radebe, P. (2015) Rain in Gauteng South Africa falls mainly over Johannesburg. African Journal of Rainfall Patterns 18, 9–20. Impact factor 1.3.

Tshabalala – 60% (conducted the research, wrote the manuscript);
Simatale 15% (assisted with statistical analyses and their interpretation);
Radebe 25% (supervisor, original idea, funded the research and reviewed the manuscript).

Advisably the statement should be certified by all authors concerned.

Alternatively early on in the thesis (e.g. after the abstract) an additional section entitled 'structure and outputs of the thesis' can be included in the thesis. This section should explain the structure of the thesis and can list the research outputs for each chapter (conference presentations and publications) and also provide the details of the involvement of each of the authors (as above).

In any thesis it is essential to establish and retain coherence to the information (story) that is being presented. When a series of published papers are being linked into a thesis the coherence becomes particularly important. For instance the conclusion of one published paper may not directly link to the introduction of the following paper in the thesis. In such a case it would be necessary (and is therefore acceptable) to insert a written discussion leading the reader to the next set of information (paper/chapter).

Different journals have different formatting for the manuscripts therefore the different papers within the thesis may have different formats. This is not a problem. However, changing all of the chapters/papers to the same format can add to the overall style and appearance of the thesis. On the other hand, presenting the thesis with the different formats can emphasise the fact that the work is already published. It is therefore recommended that this point be discussed with the supervisor.

1.3 References and bibliography

References should be chosen and cited to:

- Indicate the source of the writer's statements.
- Acknowledge another person's work.
- Provide a source of additional information.

The relevance of any reference should be carefully considered and the number of references kept to a necessary minimum. All references appear together at the end of the publication. The citations must be given in sufficient detail for easy retrieval of the information.

2.1.1 Referencing systems

There are a number of different referencing systems. The two most commonly used in scientific literature are the Harvard system and the Numerical system. Candidates should consult their supervisors on this matter. You should note that styles for citations vary tremendously from discipline to discipline, and that not all the points mentioned (e.g. title of paper, or inclusive pagination) may be necessary.

Harvard systems

The references are referred to in the text by the author's surname followed by the year of publication (in brackets) and are listed in alphabetical order by year of publication in the list of references. If the same author is cited more than once for a given year the letters a,b,c are used to distinguish the articles. If their citation is only to a particular page then this is shown by the use of a colon followed by page numbers (after the date).

If there are more than three authors, only the first (senior) author's name is given in the text followed by 'et al.' Note the recommended layout of the reference list.

Specimen text

A succinct account of the basics of interactive television programming has recently been given (Bolton, 1981).Nyhan and Johnson(1980: 399) have summarised the economic implications. Robertson (1979) has reviewed some of the technical aspects. Veith (1981a, 1981b) has provided the best all-round accounts of teletext and videotext.

REFERENCES

Bolton, W.T.(1981) A lesson in interactive television programming, *Journal of Library Automation*, vol.14, no.2, pp.103-108.

Nyhan,M.J. and Johnson, P.(1980) Videotext and teletext in the United States, *Telecommunication Journal,* vol. 46, no.6, pp. 396-400.

Robertson, A. (1979) Teletext and viewdata, In: Johnson, P. ed. *Television to Home Computer,* Poole: Blandford Press, pp. 119-145.

Veith, R.H. (1981a) *Teletext*, Urbana: University of Illinois, 1981.

Veith, R.H. (1981b) *Videotext*, Urbana: University of Illinois, 1981.

The style used in the abovementioned citations is based on ISO 690, International Organization for Standardization (1984).

Numerical system

The references are numbered in ascending order in the text, and are listed in that order in the list of references. In the text itself, the numerals are typed slightly above the list of the text.

Specimen text

Bolton [1] has given a succinct account of the basis of interactive television programming. Nyham and Johnson [2] have summarised the economic implications. Robertons [3] has reviewed some of the technical aspects. Veith [4,5] has provided the best all-round accounts of teletext and videotext.

REFERENCES

1. Bolton, W.T. A lesson in interactive television programming, *Journal of Library Automation*, vol. no 14.2, Feb. 1981, pp. 103-108.

2. Nyhan, M.J. and Johnson, R. Videotex and teletex in the United States, *Telecommunication Journal*, vol., no 46. 6, Mar. 1980, pp. 396-400.

3. Robertson, A. Teletext and viewdata, In: Johnson, P. ed. *Television to Home Computer*, Poole: Blandford Press, 1979, pp. 119-145.

4. Veith, R.H. *Teletext*, Urbana: University of Illinois, 1981.

5. Veith, R.H. *Videotext,* Urbana: University of Illinois, 1981.

The style used in the abovementioned citations is based on ISO 690, International Organization for Standardization (1984).

2.1.2 Citations

The order in which items in the references are listed is as follows:

- Authors' names
- Titles of article, book, report, Theses or Dissertation
- Edition numbers of book or report number of report
- Location of publisher (in the case of a book)
- Name of journal, publisher, conference, sponsor or report or the word Transactions or Proceedings followed by name of report
- Location of journal, conference, sponsor or society if not well known
- Volume number, issue number, month (abbreviated) and year of journal article or report. Year of book, Theses or Dissertation
- Inclusive page numbers of journal articles.

2.1.3 Punctuation guidelines

- Comma is inserted after author's surname, but full stops are inserted after author's initial(s)
- Names of journals are written in full unless the abbreviation is accepted practice in the relevant discipline
- Titles of books, reports, Theses, specifications and journals are capitalized; those of articles submitted to journals and conference transactions and proceedings have the first word only capitalized
- Titles of books and journals are either typed in italics, typed in bold print or underlined

2.1.4 Examples of citation for different types of publication

Journal article:

Del Sasso, L.A., Bey, L.G., and Renzel, D. Low-scale C-flight ballistic measurements of guided missiles, *Journal of the Aeronautical Sciences,* vol. 15, no. 10, Oct. 1058, pp. 605-68.

Book:

Brook, E. *Using Compilers to Build Compilers,* Santa Monica: Systems Development Corp, 1960, pp. 1-3. (Systems Publication, 176).

Transactions or Proceedings:

Brutsaert, W. Some methods of calculating unsaturated permeability, *Transactions ASCE,* vol. 49, no. 3, Nov. 1953, pp. 400-405.

Theses or Dissertation:
Patton, F.D. *Multiple Modes of Shear Failure in Rock and Related Materials,* PhD Theses, University of Illinois, Urbana, III, 1966.

Conference reference:
Pecknold, D.A.W. and Sozen, M.A. Calculated inelastic structural response to uniaxial and biaxial earthquake motions, *Proceedings of the International Association for Earthquake Engineering Fifth World Conference on Earthquake Engineering,* Rome Jun. 1973.

Discussions or Closures:
Bell, J.M. Discussion of Dimensional parameters for homogenous earth slopes by Jamieson, A.R. *Journal of the Soil Mechanics and Foundation Division, ASCE,* vol. 94, no.SM3, May 7 1968, pp. 763-766.

Specification or Code of Practice:
British Standards Institutions, *Specification for the Use of Structural Steel in Buildings,* London: British Standards Institution (1969) (BS 449 Part 2).

2.1.5 **Bibliography**
Any supplementary literature not referred to in the text, but considered to be relevant and of interest, may be put after the references in a Bibliography.

3 HEADINGS AND NUMBERING
The arrangement of headings of various levels (hierarchical positions) reflects the organization of the contents of the Theses.

The levels of headings may be indicated by typeface and format alone. For example, the heading **'TWO-PHASE FLOW'** is recognizably of higher level than **'Onset of flow instability'.**

The numbering of such headings further clarifies the importance, sequence and interrelation of the portions of text under each heading. Thus, the headings **'2 TWO-PHASE FLOW'** AND **'2.3.3 Onset of flow instability'** are more informative than those in the example above.

Numbering also facilitates cross-referencing within the text: compare the economy of '…see 2.3.3 …' with '… see **Onset of flow instability** in the **TWO-PHASE FLOW**…'.

3.1 Rules of numbering
The recommendations given below are compatible with the International Standard ISO 2145 (1978).

- First level headings (usually chapter headings) of a Theses are numbered continuously beginning with 1
- Each main division of text (chapter) may be divided into any reasonable number of subdivisions, having second level headings which are also continuously numbered. This method of division and numbering can, in principle, be continued to any level, but tends to become clumsy and confusing at the fourth level and beyond
- Numbering should thus be confined to the first three levels. Further (unnumbered) levels of headings may be identified by typeface and format (see 3.2)
- The numbers designating headings of different levels are separated by full stops (the present document serves as an example). No full stop appears after the last number; if only one number (that of a first level heading) is present (thus, **'2 TWO-PHASE FLOW'** and not **'2. TWO-PHASE FLOW'**)

3.2 Typeface and format
The typeface and format of all headings should reflect their levels, independently of numbering. The typographical details of the system of headings will be dictated largely by the printing system that is used in final production of the Theses. Whatever the typography, it is essential that the system be logical and that it be applied consistently.

Modern practice favours left-hand-justified, rather than centred headings. Note also, that no full stop appears at the end of a heading.

3.3 Examples of systems of headings

1 FIRST LEVEL HEADING (Bold) or CHAPTER 1 (Bold)

1.1 Second Level Heading (Bold)

1.1.1 Third level heading (Bold)

Fourth level heading (Bold and/ or Italics)

Fifth level heading (Bold and/ or Italics). This leads into the text on the same line.

4 STYLE AND PUNCTUATION

Style implies choice. However, in technical writing there are also constraints which limit choice. The following are some points which must be considered in Theses writing.

4.1 Text structure

A good Thesis should be comprehensive and precise. To be concise at the same time the writer must watch his/her presentation carefully. He/she should read through his/her presentation carefully. He/she should read through his/her draft critically and eliminate unnecessary material. Where the writer's language is not English, it is most important that he/she should seek help in this draft reading process.

The following are some of the techniques that will help:

- Break down complex statements into lists
- Use the active voice where appropriate
- Do not use pompous words or jargon where simpler words are as effective
- Avoid empty phrases such as 'it is interesting to note that…'
- Avoid unnecessary words, eg ' the precipitate was found to be in a wet condition' which means simply that 'the precipitate was wet'

4.1.1 Word choice

Use of the personal pronoun

The argument against using personal pronouns in Theses is that the subject matter is the important thing and the author is not. This is basically sound as long as it is not carried to excess. When, however, it leads to vagueness in phases like 'it is considered' or to ponderous writing like 'the author is of the opinion', then it is better to use a personal pronoun, e.g. 'I consider' or 'I think'.

Technical language and jargon

Technical language is a necessary part of scientific writing. The writer must, however, be certain that his/her audience will understand the language he/she uses. Where there is doubt, he/she should define his/her terms, either in the text or in a glossary.

For example, 'The hydrostatic loss appears to be responsible for dumping (or weeping) from sieve places…' is acceptable in a Theses intended for people familiar with distillation terms and concepts, but the statement becomes mere jargon where the potential readers may not be experts in the field.

Ordinary English may be misused by using intransitive verbs. One cannot react alcohol with acetic acid or state that alcohol was reacted with acetic acid. These statements are grammatically incorrect.

Jargon is often created by introducing strange and unnecessary new words. For example, colonise, oxidise and analyse are acceptable through general usage, blendorise, insolubilized and solubilization are not: however frequently they may be used in a chemical laboratory they are unknown outside it.

4.1.2 Tenses

A guide like this cannot cover the ramifications of the uses of tenses in Theses writing. The following points may help, however, to avoid the more common errors.

- Reports of work done are usually written in the past tense
- Where, however, universal truths such as natural laws are stated, then the present tense is generally used

- Do not change tenses in a sentence unless there is good reason for it. For example, if we say, 'The balloon rose because the hydrogen inside it was lighter than air', we may mean that this might apply only under the observed conditions; or we may mean that the gas used is inherently lighter than air. To make the meaning clear we must mix tenses within the sentence, eg 'the balloon rose because hydrogen is less dense than air'. But complications arise when tenses are changed without the writer having had a specific intention in mind

4.1.3 Sentence structure

Active and passive voice

Traditionally technical writers have regarded the passive voice as the only acceptable form of presentation. In modern writing, however, the active voice is used far more often. Phrases like 'Economy justifies the procedure', are preferred to 'the procedure may be justified in the interest of economy'.

Sentence length

Long sentences with a number of dependent clauses are difficult to follow, particularly if the subject itself is complex. Reading tests have shown that sentences with more than 25 words are generally difficult to comprehend. Unless, therefore, you are a master of the use of the English language, avoid long sentences.

4.1.4 Paragraphing

Paragraphs are there to help the reader. They do so by breaking up the text into manageable sections. This objective is often not achieved, however, because of poor paragraph construction. The following guidelines will assist in organising paragraphs:

- A paragraph should consist of a central statement supported by a group of details
- In technical writing the main statement is usually at or near the beginning. For argument or persuasion, however, the central statement is often placed at the end as a climax to the supporting details
- The transition between paragraphs should be smooth, with some form of connecting link in the text
- Long unbroken sections of text are discouraging to the reader and therefore paragraphs should not be unduly long. If your writing has many paragraphs exceeding 100 words, you should examine it critically

4.2 Conventions

4.2.1 Capitals

There is much confusion about the use of capitals and authorities differ considerably. The modern trend, however, is to use capitals sparingly. The following are some general guidelines:

- The first word in a sentence and in a direct quotation are capitalized; proper nouns are capitalized and common nouns such as river and company are also capitalized when they form part of a name e.g. River Amazon
- Common nouns are capitalized when they are used with a number or letter to designate a specific thing, e.g. Laboratory D

4.2.2 Acronyms

An acronym is a word formed from the initial letters of a name or by combining initial letters, or parts of a series of words, e.g. 'radar': RA(dio) D(etecting) A(nd) R(anging). Certain acronyms like, 'radar' have become dictionary words. In general, however, use acronyms sparingly and, when using them for the first time, spell them out. Where the acronym is not an accepted dictionary one it should be in capitals, e.g. ESCOM.

4.2.3 Spelling

In a language as complex as English there is no simple set of rules. When in doubt (eg, when to use 's' and when 'z') consult the Shorter Oxford English Dictionary (1973) which gives the accepted standard English spelling (preferred to the American) or Oxford Dictionary for Writers and Editors (1981). We highly recommend you use the Oxford English Dictionary (OED) available online at

http://innopac.wits.ac.za/search~S0?/Xenglish+oxford+dictionary&SORT=DZ/Xenglish+oxford+dictionary&SORT=DZ&extended=0&SUBKEY=english%20oxford%20dictionary/1%2C99%2C99%2CB/frameset&FF=Xenglish+oxford+dictionary&SORT=DZ&6%2C6%2C

This dictionary, in addition to guidance on spelling, gives useful information on punctuation.

4.2.4 Abbreviations
Use only generally accepted abbreviations and symbols.

4.2.5 Punctuation
There are some 36 chief marks of punctuation. However, many of these are used only in specialised linguistic contexts and all should be used sparingly. For a concise guide to the use of the more common punctuation marks see Houp and Pearsall (1984).

4.2.6 Pagination
Pagination should run consecutively through the Theses with all pages (including figures, tables, numbered etc).

5 NON VERBAL MATERIAL
The customary medium of communication is language. However, in the sciences and engineering extra-linguistic material such as numbers, symbols, mathematics, tables, graphs and illustrations of various kinds are frequently used. A cardinal principle for such material is that is should be used only when it is the most effective means of communication and understandable to the target audience. (These guidelines are a little out-dated but still useful)

5.1 Numerals
The rules for the correct use of numbers are simple and are in the main based on common sense. In the text use words rather than numerals below ten. Exceptions to this rule occur in illustrations and tables, or when integers are associated with unit symbols. For numerals above ten, use whatever provides optimum clarity and good appearance.

- Where it is necessary to have decimal fractions these should be expressed in numerals, e.g. 'The original design required 2.7 times as many components as were finally used'. Do not begin a sentence with a numeral. This can lead to confusion and is in any event displeasing to the eye.
- Ordinals from 'first' to 'tenth' should be written out. For higher ordinals the author should once again use his/her discretion.
- Avoid writing out large and small numbers by using either accepted prefixes or exponential notation, e.g. 253 x 10^3 or 0,253 x 10^6. Where large numbers must be written out these should be separated by a small space into groups of three counting from the left or right of the decimal sign, e.g. 5 241,2. For numbers less than unity, a zero should precede the decimal sign, e.g. 0.352. When listing numbers – as in a table – always align them on the decimal sign. In South Africa the decimal comma was initially used instead of the decimal point but common practice is now a point.

5.2 Mathematics
Mathematics included in a text should form an integral part of the argument and should be intelligible to the intended readers.

Mathematics must be carefully presented – using typewritten symbols as far as possible and putting in the remainder neatly in ink. This should no longer be necessary as computer software provides all mathematical and notion needed. The units and symbols used should be consistent and follow international practice as detailed in British Standards Institution (2010) or International Organization for Standardization (2010).

The form of presentation of a mathematical expression should be such that it:

- Brings out clearly the structure of the expression
- Is as simple as possible to type

To comply with the last two points, algebraic fractions in the text should make use of a solidus and not a horizontal bar. Thus write $(ax+b)\ /\ (cx+d)$ and not $\frac{ax+b}{cx+d}$. However, note that careless

use of the solidus can lead to ambiguities. Thus $a+b/y$ means a + $\frac{b}{y}$ and not $\frac{a+b}{y}$. Such ambiguities can generally be overcome by the use of parentheses, as in ($a+b$) / y , log (a / b) and ($\sqrt{3}$) x. Be sure that all parentheses and brackets occur in pairs. Exponential expressions should be set up as e $2nx/3y$ or exp $(2nx/3y)$ rather than as e $\frac{2x}{3y}$

However, with more complicated expressions the foregoing rules may violate the conditions above. It may then be necessary to simplify the expression or set it out on a line all to itself. For example:

$$q = \frac{L(t_0 - t_3)}{\frac{1}{2nr_1h_1} + \frac{1}{2nk} 1n \frac{r_2}{r_1} + \frac{1}{2nr_2h_2}}$$

can be set out as:

$$q = L(t_0 - t_3)/\Sigma R_t$$

where

$$\Sigma R_t = (1/2\pi_1 h_1) + (1/2\pi k) 1n(r_2 1 r_1) + (1/2\pi_2 h_2)$$

Modern practice favours left justification on all equations, as shown above, rather than vertical alignment of equal signs. Where the right hand side of an equation is too long to fit on one line, a break should be made before an operational sign (eg + or -) or at some other logical point, but preferably not within a bracketed statement. The next line, starting with an operational sign, should then be placed just to the right of the equal sign. It may, however, not always be possible to avoid breaking a statement within a bracket. In this case the above rule should be observed as far as possible, as illustrated in the following example:

$$\Delta\omega = (1/y)\left[\int F(\nu_1 A_1)\phi_1\phi_2 dV + \int F(\nu_1 A_2)\phi_1\phi_2 dV + \int F(\nu_2 A_1)\phi_1\phi_2 dV - \int F(\nu_2 A_2)\phi_1\phi_2 dV\right]$$

were

$$y = \int (\phi_1\phi_1 + \phi_1\phi_2) dV$$

Particular care is required in the use of subscripts and superscripts. They should be placed next to the main symbol and half a space below or above it respectively. Where both are used they must line up vertically,

i.e. A_s^2 not $A_S{}^2$. Thus e$^{x^2}$ should become exp x_2 and E_{1_a} becomes $E_{1,A}$. Periods are

generally omitted in abbreviations, e.g. T_{max} not $T_{max.}$

Standard symbols should be used wherever possible and the recognized literature in the field consulted for references to these.

5.3 Tables

Tables are best used when data cannot be clearly presented in graphical form. For example, discrete data sets can frequently be compared more effectively by using a bar chart than a table. In one sense a table is a form of graphical presentation. As such it should be kept simple and clear. Only relevant information of conclusions should be included. There is no need to put in all intermediate steps or results – they only cloud the main issue.

Tables can be arranged either vertically or horizontally. Vertical tables are those which can be read when a page is in the normal position. Clearly they are the most convenient to read. Where possible they should be arranged to fit into a single page of the document. Horizontal tables are used where their size is such that they cannot be fitted into the width of the printed page.

Each table should have a heading and be numbered with Arabic numerals. Tables in Theses should be numbered as follows:

- Firstly by the number of the main text division (chapter) in which they occur.
- Secondly, by Arabic numerals running consecutively through that text division.

The two numbers are separated by a full stop. Thus, the first table in Chapter 2 is **Table 2.1**, the second table in Chapter 2 is **Table 2.2** etc. The same principle holds for lettered appendices, but the full stop is omitted. Thus the third table in Appendix E is **Table E3**. Tables should be referred to in the text by means of the table number.

Tables in papers for journal publication are numbered (without reference to the main text division) consecutively with Arabic numerals throughout the text. The columns in a table should be arranged for easy comparison, related information being brought together. Each column should carry a brief heading and include consistent units where relevant. The same symbols, units, and abbreviations should be used in the text. Table 5.1 illustrates some of these rules.

Table 5.1 Calibration of rotameter

Position of Float (mm)	Flow rate (m^3/h)	
	T_L = 17°C	T_L = 120°C
100	0,451	0,425
200	0,736	0,720
300	1,027	1,015
400	1,348	1,342
500	1,656	1,672

In column headings avoid using expressions like $x10^{-3}$ as these are ambiguous. It is not clear whether the figures in the column have already been multiplied by 10^{-3}. Rather use the recognised metric prefixes, e.g. 'mm'. Where this is not possible, make sure the heading is unambiguous even if it appears clumsy. For example, use 'Capital cost:Rm' rather than '$x10^6$ = Capital cost in R'.

5.4 Illustrations

All illustrations (graphs, photographs, drawings and diagrams) are referred to as **Figures.** Each has a number and a descriptive title which should be placed below the illustration. Numbering follows the same principles as those for tables (see 5.3). Thus, the first figure in Chapter 2 is **Figure 2.1,** the second **Figure 2.2** etc. The third figure in Appendix E is **Figure E3.**

Figures in papers for journal publication are numbered consecutively with Arabic numerals throughout the text.

5.4.1 Graphs

3D-graphs can take on a number of different forms, e.g. bar charts, divided circles, pictographs, or line graphs. The appearance of a graph is its major attribute. It is, therefore, up to the writer in choosing one of these forms, to decide on the impression he/she wishes to convey. As line graphs are most frequently used in scientific and technical work, attention here will be directed primarily to this type. Line graphs are mainly used to show the relationship between a continuously varying independent variable and one or more of its dependent variables. Wherever possible use should be restricted to this purpose. In preparing graphs for inclusion in a Theses the following should be borne in mind:

- The graphs should illustrate clearly the point which the writer wishes to make
- The scale chosen should be such that only the relevant parts of the curve are presented, that is, the grid should not be extended unnecessarily beyond the limits of the curve to be shown
- If it is necessary to suppress the zero this should be clearly shown
- The choice of grid size depends on the accuracy required
- The scale should be easy to read and be restricted to multiples and submultiples of 10
- Units should be clearly stated and written so that they can be read easily
- The caption should be brief but self-explanatory and be positioned underneath the graph; any notes or supporting documents, if necessary should be placed below the title
- To ensure clear reproduction graphs should not be overburdened with detail

Fig 5.1 is an example of a good graph

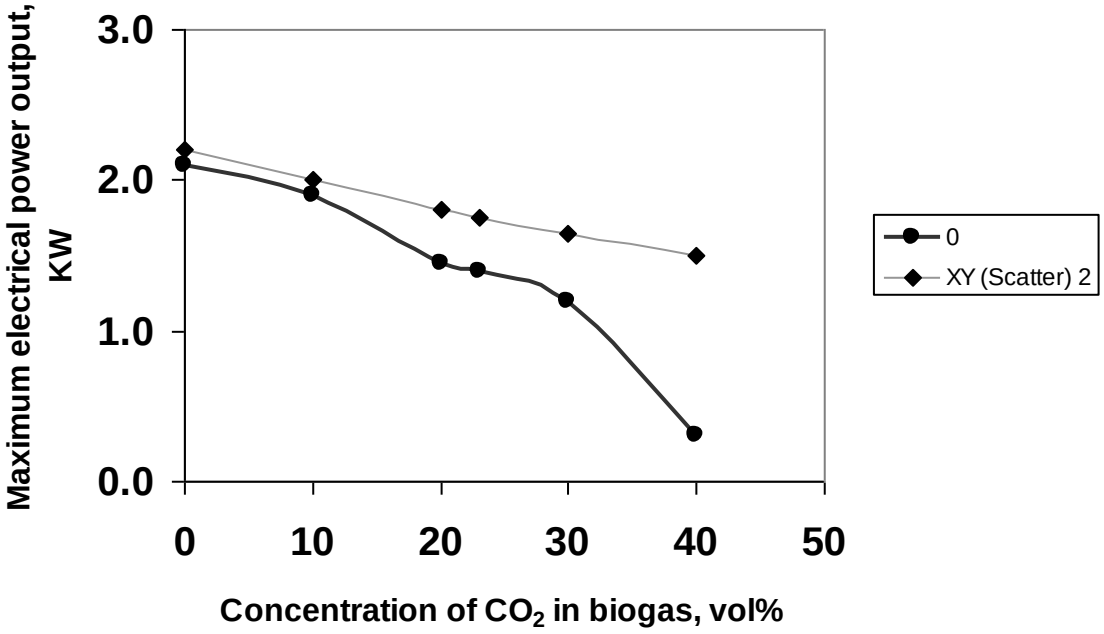


Figure 5.1 Effect of carbon dioxide concentration in biogas on power output

Graphs should be drawn on high quality paper. The lines should usually be at lease 1mm thick and number or figures should not be too small.

5.4.2 Drawings, diagrams and photographs

Line drawings and diagrams are made up of lines, words and a few special symbols. They must, as far as possible, be simple and uncluttered with detail: working drawings are normally not acceptable. Unless they serve to clarify the verbal content of the report, or express an idea more vividly than words can, drawings or diagrams serve no purpose. Only generally accepted graphic symbols should be used.

The inclusion of photographs may occasionally prove useful and sometimes even necessary. If they are to be used they should be taken with care. Cluttered backgrounds and views of unrelated equipment should be avoided. Adequate contrast should be provided, and care taken so that important details do not fall into shadows or become obscured by the glare of highlights. Some sort of scale should be included so that the size of the object is reflected. Lettering on prints may be necessary, but care should be taken to ensure that the letters stand out.

Any illustrative material which cannot effectively be reduced to A4 format, but which is relevant may be included in a pocket on the inside back cover of the Theses or included as foldouts.

6 PRODUCTION OF THE THESIS

6.1 Type layout

A Thesis should be typed. A clear font such as Arial or Times New Roman should be used. Italic script or other unusual type faces should generally be avoided unless they are necessary. A font size 10 or 12 should be used. The font colour must be black.

The main body of the text should be typed in one or one and a half line spacing and generous margins should be allowed. Typed pages should be aligned at a constant distance from the top and bottom of the page, although the top margin of the first page of a chapter may be lowered slightly. (A specimen page layout is shown in Appendix E.)

The following are suggested dimensions of margins:
Top, bottom and right: 30 mm
Left: 40 mm

All work should be justified to the left margin and should not normally be indented. Avoid full justification of text as it reduces the readability of the Theses. Use a double space to indicate a new paragraph.

A good quality white bond paper of A4 size should be used. First submissions should be printed back to back and bound. Final submissions should be printed on one side only and unbound.

6.2 Illustrations

Illustrations form a very important part of a Thesis and should be carefully prepared. Whatever method of reproduction is to be used for their presentation in the Theses, the essential requirements are that a table or illustration should be neat, concise, legible and, above all, comprehensible. Originals of photographs are not necessarily required but it is essential that any reproduction of a photograph, such as a photocopy, is clear.

7 EDITING AND REVISING

7.1 Checking, rectifying and polishing

Editing the first draft is the author's responsibility; he/she cannot expect his/her supervisor or any outside person to:

- Determine the accuracy of the information
- Clarify ambiguities
- Emphasize important issues
- Check spelling.

The editing process is essentially one of critical evaluation of the manuscript against the requirements set by the objectives of the research. The main requirements are those of content, or orientation to the reader and of accuracy, brevity and clarity in the functional writing style. The author should evaluate each chapter of his/her Theses and check whether it:

- Has real content
- Is free from inaccuracies, ambiguities and bias
- Emphasizes important issues and is free from verbosity, irrelevances and unnecessary detail
- Can be understood readily
- Is appropriate to the situation

Before starting the process of checking, rearranging and polishing, the writer should preferably leave his/her draft for a few days so that he/she can mentally switch to the role of a critical reader.

The editing consists of three operations which should be done separately. These are:

- The integrity edit
- The logical progression edit
- The text and language edit

7.1.1 Integrity edit

The contents page should be examined and the following points checked:

- Are the headings and subheadings clear descriptions of what is covered?
- Do they form a recognizable logical pattern and is the numbering system used a reflection of this pattern?
- Are the headings grammatically parallel?

Next the text should be checked page by page for the following:

- Are the headings and numbers identical to those used in the list of contents?
- Are the tables and figures properly numbered and in sequence, and do they have informative headings and captions?
- Are tables, figures and references correctly cited in the text?

7.1.2 Logical progression edit

Each chapter should be read as rapidly as possible to:

- Check that the objective is clearly stated and that the concluding section shows whether or not the objective was achieved
- Check that the logical thread is apparent; any jumps or gaps in the progression are usually an indication of faulty organization; mark these, but do not correct at this stage
- Check in particular whether sections contain anything which does not belong there

The conclusions list should arise from the discussion. Structural defects must be corrected before the text and language edit.

7.1.3 Text and language edit

Only when one is satisfied with the basic format of the report should one concentrate on the structure of the text and the use of language. The text may include non-verbal components such as graphs and illustrations. These should be evaluated as part of the text. The criteria for evaluating functional writing, mentioned before are:

- **Content criteria**
  - Accuracy – sufficient for the needs of the audience
  - Brevity – leaving out irrelevancies and at the same time covering the essentials adequately
  - Clarity – avoiding vagueness and ambiguity
  - Emphasis – drawing attention to significant information
- **Tonal or attitudinal criteria**
  - Appropriate to the situation
  - Concern for the needs of the audience
  - Serious treatment of subject matter
  - Authoritative without being writer-centred.

The specific aspects of language usage discussed in Section 4 should be consulted.

7.2 Graphic material

Essentially the same criteria used in the language edit, viz accuracy, brevity, clarity and emphasis can be applied to graphic communications.

One of the main reasons for using graphics is their ability to give overall view and show relationships. Any graphic material which fails in these important areas probably does not justify the extra effort of using it.

7.3 Time and space separations

Most Theses are prepared for consideration within a short time and often for a local audience. However, once accepted, a Thesis becomes part of the body of scientific literature. Writers should therefore draw attention to information that is only valid for a short time. The writer should be aware that points which are valid locally (e.g. under Highveld condition an altitude of about 1500m) are not necessarily valid generally. For instance, a recommendation to install solar heating panels on north facing roofs will not make sense in the northern hemisphere. Cost data are also subject to variation by place and in time, and the exchange rate and other relevant factors may have to be specified to make matters clear.

7.4 The external viewpoint

The author may claim to be objective. Usually he/she is not – at least, not to the extent required for a good manuscript. Therefore the external reader's viewpoint is needed. This can be provided by a supervisor or critical colleague who does not have to be an expert in the subject of the manuscript, but who must be able to place himself/ herself in the position of the intended audience. He/she should be skilled in recognizing the errors authors make and should annotate the manuscript accordingly and, in addition, suggest ways of improvement. The best manuscripts are produced by a co-operative interaction of author, supervisor and independent editor.

7.5 Rewriting

Of all tasks, rewriting a text is the most unpopular, yet if we wish to develop a clear style it is usually essential. Editing tends to concentrate on the correction of errors rather than elegance of diction.

Rewriting all or a substantial part of the text is usually the only way of getting an elegant well-balanced text.

7.6 Readability of texts

One of the main objectives of editing is to improve the readability of the text. The factors affecting readability have been extensively studied and various indices have been proposed. Most of these, however, were developed for school textbooks or general reading. Comparatively little work has been done on assessing their relevance to technical writing. For this reason readability measures should be used with caution in evaluating technical writing. This applies particularly where the index is given as a measure of reading age. In spite of this, readability measures have a role in comparing texts and are useful in placing them in a rank order of readability.

One of the simplest to use is the Gunning Fog Index. This measure depends on two factors, sentence length and percentage of 'difficult' words. The procedure for calculating the Fog Index is as follows:

- Select a passage of about 100 words of continuous prose (avoid passages containing lists)
- Calculate the average number of words per sentence, ie average sentence length (L)
- Calculate the percentage (P) of difficult words. This is done by counting the number of words containing three or more syllables and expressing this number as a percentage of the total number of words in the passage. Three-syllable words ending in –ed or –es, words that are normally capitalized and coupled short nouns (eg bookkeeper) are not counted
- Calculate the Fog Index using formula
- Fog Index = 0,4 (L + P)

Texts with an index below 10 may be staccato, while those above 16 may be unnecessarily difficult. It must be emphasized that the Fog Index is one of many criteria that can be used to evaluate texts. A skilled worker can produce readable long sentences while a poor writer can make a short sentence difficult to read.

7.7 Computer editing

Editing programmes must be used. These include spelling and grammar checks, calculation of readability indices and the production of an index.

7.8 Outline processor, spelling checker, cross referencing facilities, index and/or contents

Authors of Theses are advised that the modern trend is to prepare your Theses yourself – right from the start.

8. LAWS AND REGULATIONS

8.1 Copyright laws

The copyright Act 98 of 1978 which is the act currently in force in South Africa applicable to both published and unpublished sources.
Direct quotations from another work are permitted to a reasonable extent for the purposes of research provided that the source and name of the author are acknowledged. Subsequent publication of the Theses as a book necessitates the explicit approval of the copyright holder for this purpose. In this connection, Theses writers should be aware also of University Rules and Regulations in the Faculty of Science Rules and Syllabus Book.

The Theses, Dissertation or other work shall –

(a) include an abstract of not more that 350 words for a doctoral Theses and not more than 150 words for a master's Dissertation
and

(b) conform as far as possible to the style and format recommended in the style guide for Theses and Dissertations.

Formal Declaration

Together with his/her Theses, Dissertation or other work the candidate shall submit a formal declaration stating whether –

(a) it is his/her own unaided work or, if he/she has been assisted, what assistance he/she has received

(b) the substance or any part of it has been submitted in the past or is being or is to be submitted for an award at any other university

(c) the information used in the Theses, Dissertation or Research Report has been obtained by him/her while employed by, or working under the aegis of, any person or organization other than the University.

APPENDIX A

SPECIMEN TITLE PAGE

A SURVEY OF THE GENUS PYRAMIMONAS SCHMARDA (*PRASINAPHYCEAE*) FROM SOUTHERN AFRICAN INSHORE WATERS

Dhiya Singh

A Dissertation submitted to the Faculty of Science, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Science

Johannesburg, 1992

APPENDIX B

SPECIMEN CONTENTS PAGE

APPENDIX C

SPECIMEN LIST OF FIGURES

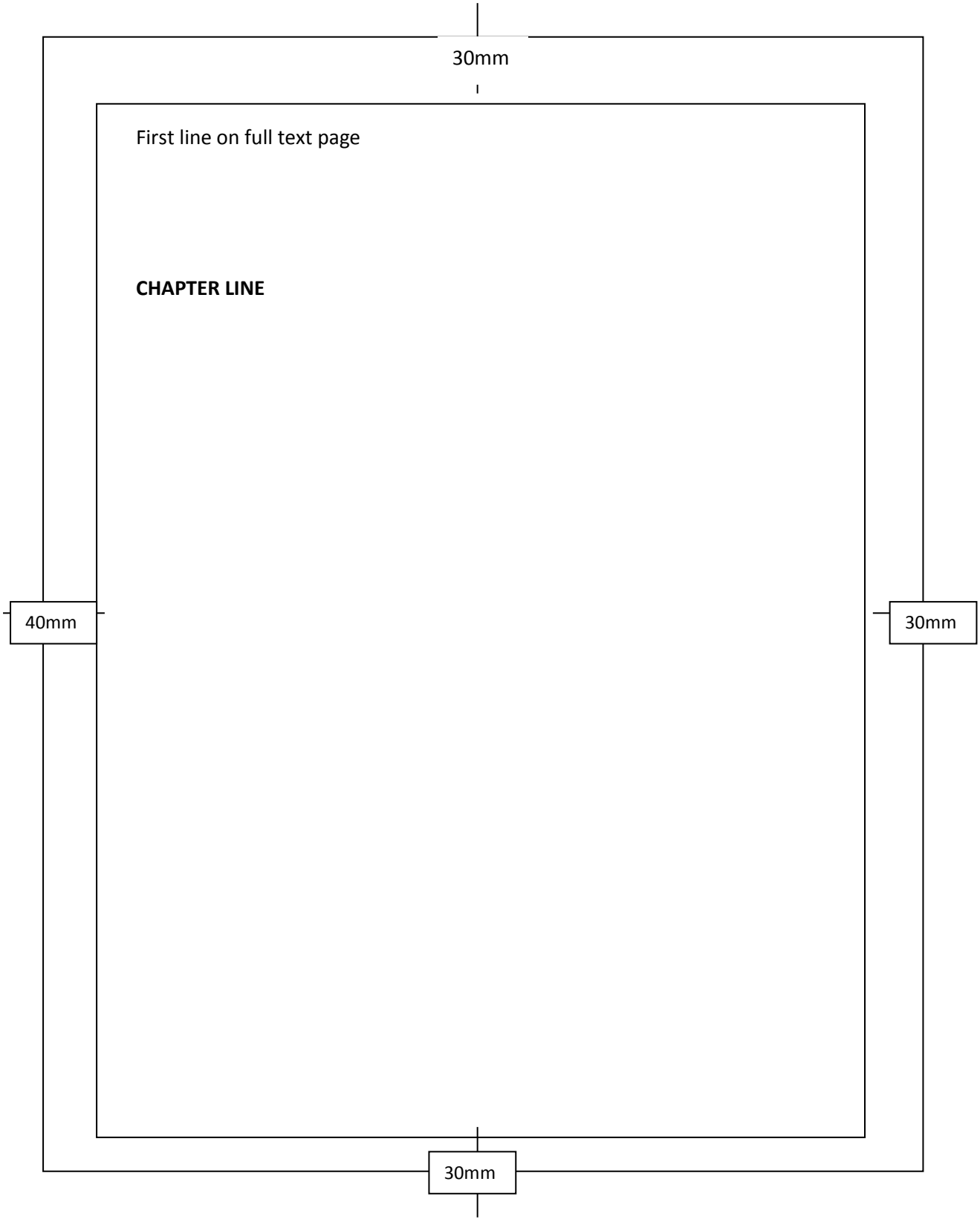
LIST OF FIGURES

APPENDIX D

SPECIMEN LIST OF TABLES

APPENDIX E

SPECIMENT PAGE LAYOUT



Outer line represents edge of paper and inner one typing area

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Note: This select list of sources consulted in the compilation of the Guide has been arranged according to the Harvard method.

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