UNIVERSITY OF KWAZULU-NATAL
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COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICINE

GUIDE TO WRITING THE MMED THESIS

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CONTENTS

INTRODUCTION

As a conscientious student you will wish to hand in the best thesis of which you are capable. Quite apart from the pride you will take in the finished thesis, you will want to present your work in the best possible light to the examiners and minimise the errors and irritations which will lead them to request corrections or, worse, require a second round of examination or even fail it.

Without guidance, students frequently hand in theses which attract adverse comments from the examiners: comments which are, with hindsight, entirely predictable (and therefore preventable). This document will help you to identify and correct some of the problems frequently encountered in a thesis. Before you submit your thesis, you must work through the companion thesis checklist (currently in preparation), which is more than a checklist but actively guides you through the final stages of completion.

PRESENTATION OF YOUR THESIS

Your thesis is a scientific document. There are a number of conventions it needs to adhere to if it is to pass through the examination process with as little criticism as possible. The more important of these conventions are:

1. It needs to adhere to scientific conventions, such as how numbers are written, decimals and statistical values handled, abbreviations used and references employed. It is not permissible for you to invent your own conventions to cover these situations, and your examiners will not like it.
2. It needs to be written in scientific style.
3. Pages, text, tables and figures need to be appropriately and consistently formatted and numbered.
4. There is an internationally accepted basic layout for a PhD thesis in terms how the information in it is set out. We in the School of Medicine have interpreted this in a way suitable to our students, and you need to follow this basic layout.
5. It needs to be free of spelling and grammatical errors.
6. Tables need to be used appropriately and consistently, easily interpretable, with appropriate row and column headings, and have an adequate caption.
7. Figures need to be used appropriately and consistently, be of good quality in terms of reproduction, be easily interpretable, with appropriate annotations and an adequate caption.

THE SCIENTIFIC ASPECTS OF YOUR THESIS

The examiners are not just examining the thesis from the point of view of its content. Their major role, one which they are explicitly instructed to perform, is to determine whether you have achieved the intellectual level and cognitive understanding of a master's degree. Central to this is that you have a deep understanding of the scientific method. Your examiners are looking critically for this as they read through your thesis.

There are a number of giveaways which indicate to an examiner that a candidate has a weak grasp of the scientific method or has not fully understood their own project. It is essential that you ensure that you are not such a candidate. These giveaways include the following:

1. An abstract which does not adequately summarise the project. If you do not understand your project, you cannot summarise it properly. Therefore, an examiner may assume that, because your abstract is poor, you have not understood what you are doing.
2. An introductory chapter which is unbalanced, which means that there is too much background detail about topics which are not actually addressed in the project, and, possibly, too little detail about those which are. The difference can be summarised as follows: good students write an introductory chapter which contextualises the project well and provides the reader with the background necessary to understand and follow the project. Weak students write as though they were writing a textbook for students on the topic of the project. The aim of the introduction is not to teach anyone, but to equip the reader to understand how and why the research was performed. It is about the *project*, not the *topic*.
3. Research question aims and objectives. Problems with these almost always result in the thesis having to be rewritten and the thesis to be re-examined, and if severe enough, lead to failure. The reason is simple. The scientific method is fundamentally based on the following sequence of reasoning:
    a. What is it that I am interested in and why?
    b. What is the *question*— a very specific question—that I am attempting to answer through my research?
    c. What is the *aim* of my research? The aim has to be to obtain the results which will answer the research question. Therefore, your question and your aim have to be directly complimentary and speak to each other. There cannot be aims divorced from research questions. If there are, then you have too many aims or not enough research questions.
    d. What are the *objectives* of my research? The candidate has to have a very clear understanding of the difference between aims and objectives. Objectives are subordinate to aims. When all the objectives have been met, then the aim will have been achieved and the question answered.
    e. If your project is built on a *hypothesis*, then you must explicitly have recognised this hypothesis and built your aims and objectives around testing it.

You must not submit your thesis if you are any doubt about any of these concepts or if you are uncertain whether they are correctly expressed in your thesis. You need to study the principles (some of the companion documents the school provides will help with this) and, if necessary, restate your research questions, aims and objectives. It is acceptable to rewrite these at the end of your project to fit what actually happened and was found during the project. It is not uncommon for people to start off on a project, only for interesting results and developments along the way leading to the project taking a somewhat different direction. All that is necessary is that you are honest. You need to restate your question, aims, objectives and hypothesis at the start of the thesis, and provide a short explanation of why and how they changed from what was contained in your original protocol. This clarity about questions, hypotheses, aims and objectives must carry through to the individual chapters or manuscripts within the thesis.

In general, the major results of the studies described in your manuscript must meet the objectives set out for the project, must cover all the stated objectives and must not refer to some invisible objective which is important in the progression of your thinking but has not been explicitly stated. Nor must you retain aims or objectives which are nowhere actually addressed in your work and your results. In other words, when the examiner scans your results, they should be content that you have met all your objectives and, in so doing, have achieved your aims and answered your research question.

4. There should in most cases be a sense of balance across your aims. If, for example, you state four aims, it is inappropriate for 95% of your discussion to speak to one aim and the remaining 5% to the other three. We can summarise this as: *If I asked the question, I must answer it*. *If I found answers (i.e. generated results), then they must relate to a research question*. (In many cases, an MMed thesis will have a single aim.)
5. Errors in logical reasoning. These are very common, particularly among theses written by clinicians. The explanation is that scientific reasoning and clinical reasoning are very different: one works for science and the other for clinical practice. Each is excellent in its own way, but they cannot be substituted for each other. Typical logical errors are:
    a. Making statements in your conclusions which are not supported by your own findings.
    b. Making statements in your conclusions which directly contradict your own findings.
    c. Drawing conclusions which go beyond those which are safe to draw on the basis of your findings.
    d. Failing to separate what your findings tell you from what is said elsewhere. For example, you should not recommend that a particular treatment is given because that is what all the papers and textbooks say, when your own work has just shown that the treatment is ineffective or even harmful. As a clinician your job is to go with the best evidence (which, sadly, may be better than your own). As a scientist, you have a duty to add to and correct current recommendations, not just parrot them.

CONVENTIONS IN SCIENTIFIC WRITING

ABBREVIATIONS

Use abbreviations sparingly and consistently. The following rules apply to the use of abbreviations in scientific writing:

1. *Necessity*: Introduce abbreviations only if the term appears frequently (about three or more times in a single chapter).
2. *Define on first use*: Write the term in full the first time, followed by the abbreviation in parentheses, e.g. *acute glomerulonephritis* (*AGN*). Thereafter, use only the abbreviation. It is common for students to make mistakes with this. You do not want the abbreviation occurring alone before you have defined it. Not do you want the full term appearing subsequently once the abbreviation has been defined.
3. *New chapters*. Start each new chapter afresh: do not carry abbreviations over to later chapters, including the Discussion chapter.
4. *Standard forms*: Where there is already an abbreviation in common use, use it, and do not invent your own version. For example, rheumatoid arthritis is widely abbreviated as RA. Do not invent your own abbreviation, such as RhA or RArth.
5. *Abbreviations which do not need to be defined on first use*. Certain terms are so widely known by their abbreviations that it is now unnecessary to write them out in full before first use. Examples include:
    a. *Units of measurement*, such as kg and mmol/L
    b. *Basic biological/medical abbreviations such as* DNA, RNA, mRNA, ATP, , HIV, AIDS, BMI, ECG, EEG, MRI, CT, USA, UK
    c. *Statistical terms* such as SD, SE, CI, IQR, p, r, R^2.
6. *Avoid ambiguity*. Do not use ambiguous abbreviations; do not invent abbreviations which overlap with an abbreviation already in common use. . For example, if you refer to the chemical *dinitroaniline* repeatedly in your thesis, it would be wrong to abbreviate it to DNA.
7. *Consistency*. Once introduced, use an abbreviation consistently. Do not use different abbreviations for the same term, and stick to the same format, such as upper case/lower case consistently. For example, say you abbreviate *people living with HIV/AIDS* as *PLH*. It must appear consistently as *PLH* thereafter, not *plh* or *PlH* or *PLWH*.
8. *Format*: Do not use full stops between letters, e.g., *DNA*, not *D.N.A*. Make plurals with a lowercase "s", e.g., *RBCs*, not *RBC's* or *RBCS*).
9. *Titles and manuscript abstracts*: Do not use abbreviations other than the universally recognized abbreviations, such as HIV and DNA in chapter titles and manuscript abstracts. It is acceptable to use abbreviations in the longer abstract which precedes Chapter 1 but do so sparingly. Firstly, only do so if a term occurs repetitively, perhaps 4-5 or more times. Secondly, define abbreviation on first use in the abstract. (You should not be using abbreviations in the other preface pages.)
10. *Headings*. It is best not to use abbreviations in major and minor headings within the thesis: better to spell out the word in full even if it has already been defined earlier in the text. This aids clarity of meaning, which is important in a heading. For example, you may have defined the abbreviation PLH for people living with HIV/AIDS in your text and have used it several times. It would still be best to write a subsequent heading as

Discrimination encountered by people living with HIV/AIDS, rather than *Discrimination encountered by PLH.* You will see that the first heading has much greater impact. Do not define an abbreviation for the first time in a heading. Write it out in full and leave the definition for the first time it occurs in the text thereafter.

11. *Figures and tables*: Define abbreviations in legends/captions, even if already defined in the text. Legends do not inherit abbreviations from the text or from previous tables and figures. The reason is that every table and figure is supposed to be interpretable on its own, without reference to the text.
12. Provide a *List of Abbreviations* after the Table of Contents. This must include every abbreviation used anywhere in your thesis, excluding the universally-recognised abbreviations such as DNA.

NUMBERS AND UNITS

UNITS

Use units correctly and consistently

1. Use only the **approved SI unit abbreviation**. Always use the abbreviation and not the whole unit name without good reason. For example, list the mass of something as 5 g, *not* 5 G, 5 gr, 5 grm, 5 grams or 5 grammes. The approved abbreviation for the gram is *g*.

2. **Spacing**. The strict SI (*Systeme International*) convention is that there should be a space between the number and the unit (e.g., 5 kg, 29 cm). The two exceptions are temperature and percentages (e.g., 37°C, 47%). That said, some journals do not require this space. While we recommend that you use the space, we will accept either, provided you are consistent.

3. **Litres.** The correct abbreviation is uppercase *L* (e.g., 5 L), given that lowercase *l* is easily confused with *I* and *1*. This requires the use of *mL* for millilitres. We expect you to use L as the abbreviation for litres, given the ambiguity of lowercase *l*. While we recommend that you use *mL*, we note some variation in practice with this. We will accept both *mL* and *ml*, provided they are used consistently.

REPORTING NUMBERS

There are standard rules for reporting numbers in scientific writing. Be careful to use them consistently.

Use numerals for numbers 10 and above.	12 patients, 25 mL
Write out numbers below 10.	three samples, five days
Use numerals for measurements, decimals, percentages, and units, even if below 10.	5 cm, 6 kg, 3%, 6.5
Use a period (full stop) as the decimal marker	4.25 mL, 0.3 g
For ranges, use "to" instead of a hyphen between numerals. This avoids confusion between hyphens and the *minus* and *negative* symbols.	5 to 10 years (not 5-10 years).
Do not start a sentence with numerals. State the number in words. If this looks clumsy, rephrase the sentence so that the number appears later.	Twenty-five patients were examined *or* We examined 25 patients *but not*: 25 patients were examined.
Use scientific notation for very large or small numbers.	1.5 x 10^6 cells or 1.5 x 10^6 cells
Use a space on either side of operators such as =, > and <. Many style guides prefer this because (a) it is easier to follow, and (b) the operator stands in for a verb, e.g., *equals*, which would typically be surrounded by spaces. This rule is not always applied, but you should use or not use spaces consistently.	p = 0.03, values < 50

ROUNDING OFF TO THE CORRECT NUMBER OF SIGNIFICANT FIGURES

Examiners will detect inconsistencies in the number of significant figures quoted and ask for corrections. For much of the research in the School, *number of significant figures* frequently equates to *number of decimal places*.

Report meaningful digits only

Use only the number of digits that accurately reflect your measurement's or calculation's precision. For example, if you measured a length with a school ruler, it would be incorrect to say that the length was 4.137 cm. *The ruler cannot measure that accurately*. The length should be stated as 4.1 cm. This applies to all scientific measurements. The number of significant figures (or decimals) must match the measurement precision.

Significant figures apply to very large numbers too. If you estimated the distance between Durban and London by some imprecise method, for example by multiplying the number of hours it takes to fly between them by the average speed, giving an answer of 13 349, you would record the distance as 13 000 km, *not* 13 349 km. This method of measuring distance is not precise enough to give values at the level of individual kilometres, tens of kilometres or even hundreds of kilometres. If, on the other hand, you calculated the distance by subtracting GPS coordinates, you could state the distance as 13 349.65 km, since GPS is accurate to about 10 m (one hundredth of a kilometre).

In calculations, use the least precise value.

The result should have the same number of significant figures as the least precise input in any calculation.

For example, if you find the mean (average) of two sodium concentrations reported by the lab, your calculator or computer is likely to return more decimal places than were in the original values, e.g., the mean of 7.3 mmol/l, 12.4 mmol/l and 9.8 mmol/l is returned as 9.83333 mmol/l. However, this implies a precision of 5 decimal places, which the lab does *not* provide. The mean must be quoted as 9.8 mmol/l, rounded off to one decimal place, like the original values. (There is an exception for averaging over many values since this tends to reduce error in the original dataset. A mean of *many* values **can** be quoted to one more significant figure, but this is a technical point, probably not one you should be using.)

For any particular measurement, all values must be reported to the same level of precision.

For example, you report values of 12.1, 34.5, 7.0 and 11.0, *not* 12.1, 34.52, 7 and 11. Note the need to add a ".0" after the unit numbers so that they match the same number of decimals. Here is the reasoning. *12.0* means that we were accurate enough to find *11.9, 12.0* or *12.1*, and we found 12.0. *12* means we were only accurate enough to find *11, 12* or *13*, and we found 12.

Use the correct number of significant figures in scientific notation for very large or small numbers.

For example: quote two values from the same set of data as 4.71×10^6 and 2.30×10^3. The first is quoted to three significant figures, so the second must be as well. This requires a final *0*: 2.30.).

Round appropriately.

Round only at the final step of calculations, not during intermediate steps; otherwise rounding errors will accumulate. Here is an example

4.2 x 6.9 = 28.98. This rounds off to 29.0

If we do the rounding first, we get 4 x 7 =28. This is a less accurate result.

REPORTING STATISTICAL SIGNIFICANCE

The International Committee of Medical Journal Editors (ICMJE) provides guidelines on various aspects of medical writing, including how to quote statistical significance in research papers. Here are the critical conventions for quoting significance based on ICMJE recommendations:

Use a lowercase* p *for p-values.

It should be in regular font, *not italics*. Insert spaces on either side of symbols such as = and <. (You will also encounter upper case "P" and "*p*" in the literature, but ICMJE recommends "p" in regular font.)

Report exact p-values down to 0.001.

For example, p = 0.03, p = 0.52. p = 0.007. All p-values less than 0.001 should be reported as "p < 0.001", not as "p = 0.0004".

Quote the p-value to the correct number of decimal places

Two decimals for $p \geq 0.01$, three decimals for $p \geq 0.001$.

Always report the p-value.

With few exceptions, do not use terms such as *was significant* or *was not significant* on their own. They should be backed up with the actual p-value, e.g., *was not significant (p = 0.15*).

Confidence intervals.

When reporting estimates, include confidence intervals (CIs) along with p-values. For example, *The mean difference was 5.2 (95% CI, 3.1 to 7.3; p = 0.002).* CIs provide additional context about the precision and reliability of the estimates.

FIGURES AND TABLES

Make sure that each figure and table is clear and comprehensible. Do not use blurred or poor-quality figures. Remember that if you use figures or tables taken from elsewhere, you must provide an acknowledgement, source (e.g. web page) or reference.

A legend must follow each figure and table. The legend must convey the purpose of the figure or legend and should be sufficiently detailed that it is possible to understand a figure or legend independently of the main text of the chapter.

Each figure and table must be numbered. Start each legend with *Figure X* or *Table Y*, numbering the figures and the tables consecutively. All figures and tables must be referenced in the chapter text, e.g., *Diagnostic criteria are summarised in Figure 1.* Figures and tables may not appear on their own in the chapter without a reference to them in the text.

Common errors in figures and tables

Examiners invariably complain about figures and tables which are blurred or unclear, do not have legends, are not referenced in the text, are not numbered sequentially, or where the reference number in the text does not match the number in the legend.

Tables and figures are described in more detail in the section dealing with Chapter 2 of your thesis.

REFERENCING

THE QUALITY OF YOUR REFERENCES

The references you provide should be *the most appropriate* for your chapter. Examiners are asked whether the student has demonstrated an adequate understanding of the literature in the field. Students who appear unable to identify the most appropriate references do not meet this criterion and should fail.

The appropriate references are (1) those most relevant to your work and (2) the most credible. If your research project concerns diagnosis, do not quote references that concentrate on therapy. Do not reference a small case series in a low-quality journal when there are far better alternatives, such as large case series in high-quality journals. Doing so usually implies that you are lazy and just making use of any reference that comes to hand. Under no circumstances should you reference the popular press and web pages other than where the web page contains an important report from an authoritative body, for example, a piece of legislation or official guidelines or where you are making a very specific point. (You might, for example, reference a newspaper headline or a popular website if you are demonstrating how public perception differs from scientific reality.)

Never use a reference without having read it. In particular, do not rely on an article's abstract or a reference to that article from another source. You will be surprised how often abstracts and other people's references fail to reflect the article's contents accurately.

Always ensure that the references you supply agree with whatever you are referencing in your text. It is common to find that a student uses a reference to support a particular point of view when that reference *actually states the opposite*. This is an immediate giveaway that you are copying references from other articles without actually reading them.

FORMATTING YOUR REFERENCES

This must be done accurately and consistently. The Vancouver system should be used for all theses except for some in the social science domain. You must note that the Vancouver system lays down precise rules for how citations (the references in the text) and bibliographies (the reference list at the end of the manuscript) are structured and formatted. You must have studied the instructions for their use, either independently or by following the instructions given to authors by a particular journal. It is not just a matter of putting a number in the text and writing some words in the bibliography.

Note that printed journal references are generally simple to format. References to chapters in books, books, e-journals, official reports and webpages are more complex and often require you to put some extra work into obtaining all the details necessary to reference them correctly (for example, the city in which a book was published, or the DOI number of an electronic article). You must provide these references correctly.

You must know how to use a reference manager like Endnote or Mendeley. Your references must be marked as the correct type so that your reference manager can format them properly in the bibliography. If chapters in books, books, electronic articles and webpages are marked as the default "journal articles", they will be formatted incorrectly. Here is a summary of the essential reference types and how they should be structured in Vancouver style.

CONTEXT	FORMAT	EXAMPLE
Journal Articles	Author(s). Title of the article. *Abbreviated title of the journal*. Year;Volume(Issue):Page numbers.	Smith AJ, Clark A, Johnson B. The impact of hypertension on kidney disease. *J Nephrol*. 2020;**15**(3):145-52.
Books	Author(s). Title of the book. Edition (if not the first). Place of publication: Publisher; Year.	Brown HJ, Miller T. Renal Pathophysiology. 3rd ed. New York: Springer; 2018.
Chapters in books	Author(s) of the chapter. Title of the chapter. In: Editor(s), editor(s). Title of the book. Edition (if not the first). Place of publication: Publisher; Year. p. Pages of the chapter.	Peters MD. Diagnosis of chronic kidney disease. In: Harris JL, editor. Advances in Nephrology. 2nd ed. London: Academic Press; 2017. p. 89-102.
Webpages:	Author(s). Title of the webpage/document. Website name. URL. Published date (or updated date); Accessed date.	World Health Organization. Chronic kidney disease. WHO [updated 2023 May 12; cited 2024 Jul 19]. Available from: https://www.who.int/health-topics/chr.
Electronic journal articles	*Where you know the DOI* Author(s). Title of the article. *Journal Name*. Year;**Volume**:Pages. doi:DOI.	Smith AB, Johnson CD. Impact of lifestyle interventions on metabolic syndrome. *J Clin Nutr*. 2023;**50**:200-10. doi:10.1016/j.jcnut.2023.03.010.
Electronic journal articles	*Where you do not know the DOI* Author(s). Title of the article. *Journal Name* [Internet]. Year;**Volume**(Issue):Pages [cited Year Month Day]. Available from: URL.	Smith AB, Johnson CD. Impact of lifestyle interventions on metabolic syndrome. *J Clin Nutr* [Internet]. 2023;**50**:200-10 [cited 2024 Oct 22]. Available from: https://www.jcnut.org/article/12345.

Explanatory notes

Published and about-to-be-published manuscripts. You may use the style of referencing required by the journal which published the article (this is automatic if you just include the PDF reprint), or if you have submitted or about to submit to a specific journal. You must follow its *Instructions for authors.*

Formatting with bold and italic. Journals have different expectations for using bold and italic in Vancouver references. A standard format is to use italics for the journal name and bold font for the volume number. This helps break up the parts of the reference. We suggest you do so.

Journal names. All journal names should be abbreviated using the official abbreviation (e.g., S Afr Med J). Do not use your own abbreviations, e.g., SAMJ. No full stops are used in the abbreviations. The abbreviations are available from Index Medicus or the journal website.

Issue number, e.g. J Nephrol 2020;15(3):145-52. The issue number here is the (3). The rule is that this need only be included where each issue has its own page numbers, starting from 1. (There are

very few journals which actually do this.) For journals where the pages are numbered consecutively from the start of the first issue to the end of the last issue, it is unnecessary to put the issue number.

Page numbers in books and book chapters. In most cases, it is sufficient to reference the book or chapter without supplying exact page numbers.

Webpages. The reason for providing the cited date is that web pages, unlike printed pages, can change. Your cited date says that you are saying that *that is what the website said on the day you accessed it*, thus covering yourself if the content of the website subsequently changes.

Electronic journal articles with DOI. Many e-articles now carry a DOI (digital object identifier). This is linked to that article as it was published at a particular time before any update. The article linked to it cannot change. You can also access the article directly from the DOI. Therefore, it is unnecessary to state the date you cited it, nor provide its web address. The DOI "freezes" the article at a particular time, even if it were somehow to change later, which it should not.

Electronic journal articles without DOI. The page can still be updated if there is no DOI but only a website address, meaning your reference may become outdated or inaccurate. Therefore, you have to give a citing date that says that *the article said **that** on **that** date*. You must also provide the URL and web address so your readers can access it. Wherever possible, use the DOI, as this makes referencing simpler.

SPELLING AND GRAMMAR

When a thesis is submitted for examination, it is evaluated from three angles. The first is its scientific merit. The second is the quality of the manuscript. The third aspect is its presentation. Issues with presentation, formatting, spelling, grammar, and style can be problematic. Examiners almost always identify such errors, which at a minimum will require corrections. In more severe cases, they may demand that the thesis be rewritten and re-examined. Examiners often note that poor presentation makes it difficult to assess the thesis's scientific merit. These errors, viewed as fundamental and expected to be addressed before submission, reflect poorly on the student, the supervisors, and the College. However, they are entirely avoidable.

It is therefore essential that your thesis has been thoroughly checked for errors in spelling and grammar before submission. We require that you run it through Microsoft Word’s spelling and grammar checker, and preferable Grammarly, which will check both spelling and grammar. It is also important to allow a third-party to read through your manuscript for you.

FORMATTING A THESIS

Refer to the companion document SMPG-2-Specimen MMed thesis *to see how the layout should look in practice.*

LAYOUT AND STYLE

PAGE LAYOUT

A4 size, portrait. The following margins work well: Top, left and right=2.2 cm, bottom=2.4 cm.

FONTS

We recommend two standard fonts: Times New Roman (TNR) and Arial or a similar standard *sans serif* font. TNR tends to look smaller than Arial, so use one font size bigger. Thus, body text (normal paragraph) for Arial is 11 point, for TNR it is 12 point. Use a standard font throughout your thesis. Stick to a few standard sizes depending on the type of paragraph or heading. The recommended style is described below.

LINE SPACING

Abstract, chapter 1 and chapter 2 other than the bibliographies (reference list). Use 1.5 line spacing. The intention is to space the text sufficiently to allow the examiner to engage easily with the text and to insert comments or notes.

Appendices, bibliographies, tables and preface other than the abstract: Use a narrower spacing since these paragraph types look unsightly when spaced at 1.5 lines. Rather than using single spacing, set spacing at 1.15 lines or at a size equal to the font size for that paragraph type + 2 pt. Expanding the line spacing to a measurement slightly larger than single spacing makes the paragraph easier to read and more attractive. This is standard practice in commercial publishing.

STYLE GUIDE

Here are descriptions and examples of recommended styles which work well in the thesis chapters.

Normal paragraph style

Normal style looks like this. TNR 12 pt or Arial 11 pt, lowercase,

Justified, line spacing 1.5 lines, space above=18 pt, space below=0 pt

Headings

Do not overuse headings. Use heading level 1 for chapters and heading levels 2 and 3 (major and minor headings) in your chapters. Use heading level 4 occasionally and heading level 5 as little as possible or not at all. Do not use heading levels below this. Using headings styles consistently like this also makes it easier to formulate your Table of Contents automatically in MS Word. Here are examples and properties.

HEADING 1

Chapter or page heading. 16 pt, all caps, bold, top of a new page, centre-aligned. space above = 0 pt, space below = 18 pt

HEADING 2

Major heading. 14 pt, all caps, bold, left-aligned, line spacing 1.5 lines, space above = 24 pt, space below = 12 pt

Heading 3

Minor heading. 14 pt, lowercase, bold, left-aligned, line spacing 1.15 lines, space above = 18 pt, space below = 6 pt

Heading 4

Sub-minor heading. 12 pt, lowercase, bold, italic, left-aligned, line spacing 1.5 lines, space above = 18 pt, space below = 6 pt

Heading 5

Sub-sub-minor heading. 12 pt, lowercase, italic, left-aligned, line spacing 1.5 lines, space above = 12 pt, space below = 0 pt

It is highly recommended that you learn how to set styles in MS Word so that you can repetitively attach them to paragraphs, instead of having to format each paragraph individually.

TABLES, TABLE LEGENDS AND FIGURE LEGENDS

Table entries can be slightly smaller and single-spaced. Centre-align column headings and make them bold, left-align row headings. Numbers usually look best centred within the cells, while text is left-aligned. Adjust your table until it is neat and easily readable. Centre the table itself on the page.

Tables should not break across pages unless they are longer than a page. If the table does break across a page, it is best to repeat the column headings at the top of the second part of the table. MS Word has a setting to do this automatically. Ensure that the legend appears immediately below the table or figure, and not on a new page.

Table entry. 11 pt, lowercase

Line spacing single, space above = 3 pt, space below = 3 pt

Legends can be smaller and should be single-spaced. They should be indented on the left and right to distinguish them from normal paragraph text. A one-line legend can be centre-aligned within this block. Longer legends should be justified, running between the left and right indents.

Legend. 11 pt, lowercase

Single spacing, left and right indent = 1.5 cm, space above = 12, space below = 18

Group	Male	Female
Healthy	24	16
Control	12	10
Total	36	26

Table3. Summary of the participants. The excess of males is characteristic of the patient population using our facility.

FIGURES

Figures must be of high quality when printed or viewed in a PDF. Do not use unclear images unless they are unavoidable; in this case, explain why there is no alternative in the text or legend.

Do not digitally enhance figures which themselves represent results. **Image manipulation constitutes scientific misconduct** and may lead to failure and exclusion from the University. If a faint feature in an image is an important feature, do not make it more obvious using image editing software. *The image is part of your results,* and cannot be "doctored", just as you cannot doctor the numbers in a table. Rather superimpose an arrow pointing to it or a ring around it and explain in the legend that the feature is identified by an arrow or ring.

LAYOUT OF THE THESIS

WRITING THE PREFACE

The preface consists of the following pages in order.

TITLE PAGE

Formatted as shown in the specimen. No page number.

DEDICATION

Formatted as shown. No page number. Numbered Roman numeral 1 (i)

APPRECIATION

This should be formatted as shown. This section replaces the *Acknowledgments* page used earlier. The reason is that the student must give an accurate account of their contribution to the work of the project and of the contributions of everyone else who collaborated in one way or another. Some of these contributors are authors on the manuscript; others are not. All their contributions are gathered together on a later page in this section.

On this page, express appreciation in a very general sense, such as the following:

I wish to express my gratitude to:
My supervisor, Dr SE Mkhize, for his patience and support.
My Head of Discipline, Prof JG Naidoo, for her never-failing encouragement
The Medical Manager of ABC Hospital, Dr JN Zondi, for allowing me dedicated time to complete the writing of this thesis
My family, for always standing by me, even…

You will acknowledge those who provided you with actual intellectual, technical and financial support in the *Authorship* page later in this section. This includes those who help with statistics, calculations, software, laboratory work, library searches, data collection and financial support. Some of these contributors are co-authors on your manuscripts, others are not. All their contributions are gathered together in the *Authorship* page Here you are not so much "thanking" them as making it clear to the examiners which parts of the project are your own work and in which parts others actively assisted you.

DECLARATION

This is a formal, signed statement confirming that the work of the thesis is all your own, except where otherwise explicitly stated and acknowledged. Use the text in the specimen.

AUTHORSHIP STATEMENT AND ACKNOWLEDGEMENTS

In this section, you will state the extent of your contribution to the work. Note that in modern science, research is very rarely the work of one individual. Journal editors and the University expect

each person's contribution to be accurately described. Failure to do so accurately constitutes academic dishonesty and is taken seriously. Compile this page under three headings.

Authors

The authorship statement refers to the authors of your manuscript or published paper. Each author's contribution is described using a system modified from the CRediT authorship statement now required by many journals. Follow the system described in the *Conventions* section of this document.

Acknowledgements

List all those who contributed but did not qualify to be an author. This includes, for example, those who contributed to the statistical analysis, proofread, performed a laboratory test, or collected data. It does not include secretarial work like typing, data capture or arranging appointments. These belong on the *Appreciation* page.

Use of AI

Identify any contribution to text or figures generated with AI. You must detail the contribution of AI to your thesis. Plagiarism-checking software will flag these contributions, and you need to reassure your examiner that their use was legitimate and acknowledged. This includes Grammarly. Spelling and punctuation changes suggested by Grammarly are not typically flagged as AI, but **rephrasing suggested by Grammarly to improve the readability of sentences and paragraphs may be flagged**.) Rephrasing is acceptable, provided it goes no further than making your thesis read better. Acknowledge its use in this section. Acknowledge use of AI for automation of complex, repetitive or mundane tasks, such as generation of computer code, designing spreadsheets or writing captions.

Acknowledgements of co-workers in the preface of the thesis

In addition to the explicit CRediT authorship statement for each manuscript, you will summarise all contributions to the entire project in the acknowledgements section in the first part of your thesis. This is described later in this document.

Example

Authorship

- *Dr GE Brown***:** conceptualisation (lead), oversight (lead), methodology (equal), data collection (lead), analysis (lead), first draft of manuscript (lead), review and editing (equal)
- *Prof K Mpathi*: conceptualisation (support), methodology (support), oversight (support), review and editing (equal)
- *Dr U Ramchand*: methodology (support), analysis (support), review and editing (support)

Acknowledgements

- *Dr JR Green* performed the statistical analysis

- *Ms HK Dlamini* assisted with the preparation of the graphs and figures.
- *The College of Health Sciences* provided financial assistance.

The help of these individuals and institutions is gratefully acknowledged.

AI

Grammarly was used to check punctuation and spelling, and to improve the wording of the text. It was not used for the primary generation of text.

TABLE OF CONTENTS

Compose this as shown in the example.

- The four main sections are the Preface, Chapter 1 (Introduction), Chapter 2 (Manuscript) and Appendices. Left-align these.
- Indent the subsections of each section below the main entries.
- Do not use include too many levels of subheadings. You do not want the table to become too long or complex. Nor do you want multiple entries sharing the same page number. The following work well: Heading level 1 (section heading), heading level 2 (major heading), heading level 3 (minor heading). Omit lower levels.
- Use Roman numerals for the preface, starting with the Dedication. Use Arabic numerals for the rest of the thesis, starting with 1 on the first page after the abstract.

LIST OF ABBREVIATIONS

A list of abbreviations is not mandatory in an Mmed thesis, as it consists of only two chapters. You may supply one if you wish.

ABSTRACT

Format

Line spacing 1.5 lines. (The examiner may wish to comment on the abstract.)

Structure

The importance of the abstract in reflecting your grasp of the scientific method and of the scientific underpinning of your project has been stressed earlier.

The University rules prescribe a maximum length for the abstract of 350 words. This is about 1.5 pages of text printed with a line spacing of 1.5 lines. Try not to exceed this. Structure your abstract as follows:

- Background
- Aims and objectives
- Participants and methods
- Results
- Conclusions.

Ensure that the abstract is accurate, which means that each section is an adequate and precise summary of the corresponding section of the thesis (or corresponding sections in all the manuscripts that make up your thesis). The abstract cannot reflect everything, but all the most significant aspects of your project's introduction, methods, results and conclusions must appear in the abstract.

Note that the abstract should not contain abbreviations, tables or figures.

WRITING CHAPTER 1

LENGTH

The length of this chapter should be about 4000-6 000 words, corresponding to approximately 10-12 pages of 1.5-line-spaced text. This excludes the bibliography.

PAGE NUMBERING

Each page must be numbered, either in the top right corner of the page or at the bottom, either in the middle or on the right. Use Arabic numerals, starting on the Chapter 1 title page.

Some supervisors want headings and subheadings to be numbered. In general, it is unnecessary, and MS Word's hierarchical numbering system is notoriously difficult to keep correctly ordered and formatted. We recommend that you do not number headings or paragraphs.

LAYOUT

Divide Chapter 1 into four sections: *title page, background and literature review, current project* and *references*.

Title page

Begin Chapter 1 with a title page, as shown in the example. The text *Chapter 1. Introduction and literature review* are placed midway down the page, as shown in the example.

Background and literature review

Here, you describe the background of the project and review the literature.

What is relevant?

The information you provide here and the literature you review must be relevant to your research problem and question. A frequent error is for students to go into too much detail about aspects of the topic *which, though relevant to the practice of medicine, are not directly relevant to the work of the thesis*. An example is a thesis where the project is centred on the diagnosis of a particular disease. The student then writes large and approximately equal amounts on the disease's aetiology, pathogenesis, diagnosis, treatment and prognosis. *This would be appropriate in a textbook but inappropriate in a thesis*. Provide no more than a few paragraphs on each topic other than diagnosis to provide context. Direct most of your attention to diagnosis, about which you will write pages. If understanding aetiology is essential to understanding the method of diagnosis you are studying, then you will expand on that, too—it may be critical to the understanding your research project, whereas treatment is not. Examiners will typically ask for all the unnecessary material in Chapter 1 to be removed. Scientific writing centres on writing crisply and accurately about matters essential to understanding the research being described, omitting everything else except some background information necessary for contextualisation.

Though the subject matter of Chapter 1 overlaps with the *Introduction* sections of your manuscript, keep them distinct. Chapter 1 contextualises and introduces the **project**; the *Introduction* section of the manuscript introduce the narrower **subset** of the work actually studied. Paraphrase freely. Avoid word-for-word repetition of text between Chapter 1 and Chapter 2.

This section should lead up to and end with a statement of the research problem, thus leading into the description of your project, which follows.

Layout

Use natural headings to break up your writing. Note the following:

- Ensure that headings are correctly formatted.
- Avoid too many headings and too many levels of subheadings. In particular, be careful not to have multiple headings with almost no text beneath them. Too many headings disrupt the flow of your writing, complicate formatting and complicate the construction of the Table of Contents.
- Remember that headings and subheadings are there to make reading and understanding easier. They are not there for their own sake.

The current project

Here you list the research question, hypothesis (if there is one), aims and objectives. End with a brief statement summarising how you set about answering the research question. This is not a detailed description of the methods. It is more an explanation of why you set about answering the question in the way you chose to, why you chose a particular approach, etc. It is an opportunity to demonstrate that you understand how to set about answering a scientific question. Keep this to one or two paragraphs.

References

The text must be fully referenced with a bibliography at the end of the chapter. Use Vancouver-style referencing as described earlier in this document. Observe all the conventions described earlier in this chapter.

Format

Line spacing 1.15 lines, left-aligned. References look unsightly when spaced at 1.5 lines. Justified alignment tends to cause wide, unsightly gaps to open up between words.)

CHAPTER 2 (MANUSCRIPT)

LAYOUT OF THE CHAPTER

Begin with a chapter title page.

Chapter title page

Format

Line spacing 1.15 lines.

Structure

Begin each chapter with a title page, as shown in the example. This contains the text placed midway down the page, as shown in the specimen thesis.

> *Chapter 2.* The title of the manuscript, as reflected in the manuscript).

Follow this with the sentence:

> *This work is presented as a submission-ready manuscript entitled* **[insert the title of your manuscript].**

Additional sentences

If you have written the manuscript in the format required by a specific journal, add the following sentence:

> *The manuscript is formatted according to the Instructions for Authors of* **[Journal name].**

If your manuscript has already been published, add the following sentence:

> *This work was published as* **[insert the full article reference in Vancouver format, as you would for any other paper in your bibliography]** *(Appendix* **[Insert number of appendix where you have included the PDF]).**

If a journal has already accepted your manuscript but it has not yet been published, add the following sentence:

> *This work has been accepted for publication by* **[Journal name].**

If your manuscript has already been accepted or published, but you are submitting an updated version for examination (see the following section), add a sentence such as this:

> *This manuscript is an edited and updated version of the manuscript accepted for publication.*

THE MANUSCRIPT

LENGTH

Published papers will be of the length accepted by the journal. Unpublished manuscripts should conform to the generally accepted lengths prescribed by the average journal: original research manuscripts: 3,000-4,500 words , review articles: 4,000-6,000 words, systematic reviews: 5,000-7,000 words. As a rule of thumb, 1000 words is about 4-5 pages of 1.5 line-spaced text.) This limit refers to the body of the manuscript: Introduction to Discussion, excluding title pages, abstract, tables and references.

Note that this is a maximum length, *not the target length*. Many good journals impose the lower limits, such as 3000 words. If you can produce a scientifically appropriate manuscript in fewer than 5000 words, so much the better. Do not pad or waffle for the sake of making the manuscript look longer. Your writing must be crisp and concise.

Length of discussion compared with introduction

The discussion should be longer than the introduction. A standard guideline is:

- *Introduction*: 10-15% of the total manuscript length (about 750 words of a 5000-word thesis).
- *Discussion*: 25-30% of the total manuscript length (about 2000 words of a 5000-word thesis).

This means **the discussion is usually 2-3 times longer than the introduction**. Aim for this, and *do not submit the reverse*. (This often happens when students use the introduction to teach the reader or to prove how much they have read, rather than using it to contextualise the research. You will use Chapter 1 to display your knowledge of the topic and the literature.) The introduction is concise, provides context, states the research question, and outlines the hypothesis, while the discussion involves a detailed interpretation of the results, comparisons with previous studies, and an exploration of the broader implications. The examiners will scrutinise your discussion with particular intensity. In this section, you display your intellect and understanding of science by searching your results for meaning, drawing conclusions and positioning them in the context of science, medicine and society.

WHICH MANUSCRIPT TO SUBMIT?

If your manuscript has not been accepted or published, insert your publication-ready document in Word format.

If your manuscript has already been accepted or published, insert your final draft in Word format, maintaining compliance with the instructions for the a*uthors* of that journal. You can include the PDF version of the published report as an appendix.

Updated version

Even if your manuscript has been accepted or published, you can still improve the manuscript you submit for examination (for example, add newer references, update a table, or otherwise improve

it). You want to be judged on your very best work. Submit the updated manuscript in MS Word format and state that this is an updated version on the Chapter title page as described earlier.

Corrected version

The same applies after examination. You will likely have had to make some corrections as requested by the examiners.

DESCRIBING YOUR STUDY

EQUATOR recommendations

All manuscripts should be structured to comply with the recommendations of the EQUATOR network: (https://www.goodreports.org/, https://www.equator-network.org/). Most MMed studies are observational and therefore covered by the Strobe checklist, which is appended to these guidelines. Ensure that, as far as possible, your manuscript contains all the information recommended by the checklist. If your study is not observational, find the correct checklist from the above web resources.

Where the manuscript has already been accepted or published, then the manuscript should be presented as required by that journal. We do not expect students to reformat an accepted or published manuscript for the purposes of the thesis.

LAYOUT OF THE MANUSCRIPT

The manuscript is structured in line with standard journal practice. The following is a generic form of that. If your manuscript has already been accepted, or you have chosen to follow the format required by a specific journal, then you need to structure it in line with its requirements.

Page numbering

Page numbers should run sequentially across both chapters. This makes it easier for you and the examiner to reference corrections. If you include published manuscripts as PDFs, include these in the numbering. Use software capable of overprinting page numbers on the PDFs.

Tables and figures

You can decide between including your tables and figures at the logical point within the manuscript, which makes for better reading and comprehension but complicates formatting, or including them after the references in numerical order, as required by many journals when submitting.

Manuscript title page

Follow the example in the specimen thesis. Do not add qualifications to authors' names. This is now an uncommon practice.

Format

Line spacing 1.5 lines from this point on until the bibliography.

Abstract

Provide an abstract not exceeding 350 words. Structure the abstract under four headings: Background, Methods, Results, and Conclusions.

Introduction

Start the introduction on a new page.

Purpose

You should have already demonstrated your familiarity with the literature and thoroughly explained the background to your research problem in Chapter 1. There will be some overlap between that chapter and this introduction, but this should be limited. Do not repeat phrases from Chapter 1 here.

Chapter 1 and this Introduction have different purposes. Chapter 1 has two purposes:

- To prove your familiarity with the field of research, discuss it broadly and include a solid literature review, using as many references as you wish.
- To contextualise your research question: how did it arise, why it is necessary, etc.

The introduction to the manuscript has a more concentrated purpose, resulting in a much shorter and more focused document (750 words versus 7500 words!). The purpose of the introduction in a scientific manuscript is to provide context and background for the research being presented. **It is not a textbook where you "teach" the reader about your subject**. You are being examined on your *science*, not your *medicine*. It sets the stage by describing the broader field of study, explaining why the topic is important, and identifying gaps or unanswered questions in the existing literature. The introduction helps readers understand the significance of the research and how it fits into the broader scientific conversation. Its focus should shift from general knowledge to the specific problem or question the study addresses, ultimately formulating the research hypothesis or objectives.

Furthermore, the introduction serves to clarify the rationale behind the study. Briefly reviewing key studies and highlighting unresolved issues explains why the research is necessary and relevant. This section also establishes the scope and aims of the research, ensuring that the reader knows what to expect in the rest of the paper. A well-crafted introduction draws the reader's interest and ensures they have enough context to appreciate the novelty and significance of the study's findings.

It is expected to end the introduction with a statement that bridges the background and the research project, e.g., *Given this background, we designed and executed a study to determine the relative survival of patients with Hodgkin's and non-Hodgkin's lymphoma*.

Note that there is often considerable leeway for specific sections of your paper to be placed in either the introduction or the discussion, particularly when you report previous papers and experience. A helpful guide is as follows. Place in the introduction anything you knew to be important *before* you conducted your study (general background). Place anything that became particularly relevant *after* your study in the discussion. For example, it is often better to describe previous studies on the same

question as yours in your discussion rather than the introduction so that you can compare your findings with theirs. In the introduction, all you can do is state who did what, and what they found. You cannot evaluate their findings in the light of your experience as you should in the discussion.

Here are some further guidelines that make your logic and scientific argument clear and significantly improve the comprehensibility of your manuscript.:

- *Try to keep like with like within a section*. Mention an aspect once in the introduction and discuss it once in the discussion. Do not keep returning to it out of sequence, with this aspect separated by others. For example, if your key topics in the introduction or discussion are A, B and C, then they should appear in the order A, B, C, and not repeatedly and disjointedly as A, B, A, C, B, C, A
- *Handle aspects of your introduction and discussion in the same order.* Describe them in the introduction in a specific order, A, B and C. Do the same in the discussion. It may even be possible to report your results in the same order, A, B, C. The logic behind your writing is then very clear.
- Best clarity is by aligning A, B and C with the three main findings of your study**.** If your results give rise to two major conclusions (call them A and B), then follow the sequence A, B in the introduction and discussion. If there are four, then follow the sequence A, B, C, D in the introduction and discussion.

Methods

This is usually laid out in three sections as follows:

(Introduction)

(Do not actually write *Introduction*.) Start the paragraph directly after the heading *Methods*. Report the place and time of the study. Follow it with a statement on ethics permission, for example:

> *The study was approved by the University of KwaZulu-Natal Biomedical Research Ethics Committee (BR35/25556).*

Patients or participants

The term *patient* applies to clinical studies. *Participants* should be used elsewhere. The term *subject* is now discouraged. Describe participants and inclusion/exclusion criteria. Include the number of participants first enrolled. Their further involvement (such as dropping out of the study) should be discussed in the results section.

End with a statement about informed consent, e.g., *Patients were provided with an information sheet (Appendix 5) and all patients provided informed consent*.

Methods

Describe the methods used in enough detail for the examiners to understand what you did. A standard requirement is that they should be described in sufficient detail for another researcher to replicate the study. Confine this section to a description of the methods. Do not provide any justification or evaluation of the methods or anything which anticipates the results or discussion here. These aspects belong to the other sections of the manuscript.

Data handling

Describe how data were stored, analysed and analysed statistically. Provide the version number, publisher and city for statistical or other software you use. This is not necessary for Microsoft Office products. Here are the standard citations for Stata and SPSS, which are supported by UKZN:

> *All statistical analyses were conducted using Stata (version* [insert version]*, StataCorp LLC, College Station, TX, USA).*
>
> *Data were analysed using IBM SPSS Statistics (version* [insert version]*, IBM Corp., Armonk, NY, USA).*

Results

The results section of a manuscript presents the data and findings of the study in a clear, concise, and objective manner. This section should focus on **what** the research uncovered, without interpretation or discussion, which is reserved for the discussion. The results should be organised logically, often following the structure of the research questions or hypotheses introduced earlier in the manuscript.

Start by outlining the primary findings in response to the key research questions or objectives. Use clear and direct language to describe the data, avoiding unnecessary detail or repetition. Numerical results should be reported with appropriate statistical measures (e.g., means, standard deviations, p-values, confidence intervals) to provide a complete picture of the data's significance and variability. Always ensure that the results in the text align with the figures and tables but avoid repeating the same data in both forms. Instead, use the text to summarise the key points in tables and figures.

Organise the results section in a logical sequence. Begin with the most important or primary findings, followed by secondary or exploratory outcomes. Each subsection can address a specific part of the study, whether describing characteristics of the study population, comparisons between groups, or results of statistical analyses. Remember the *A, B, C* approach discussed earlier. There must be a structure to your results. Do not dribble results out across the pages.

In addition to reporting the findings, remember to highlight any negative or unexpected results. These findings are just as important as positive outcomes, as they contribute to the overall transparency and integrity of the research. Avoid interpreting these results at this stage; save the interpretation of their meaning or implications for the Discussion section.

Text, tables and figures

Results may be displayed or described in three formats: written sentences (text), graphs, or figures. You need a systematic approach when deciding how to use these three formats. Some data are better described in one format than another.

Text

The purpose of the text in the results section is to present and summarise the study's key findings clearly and objectively. It guides the reader through the data, highlighting the most important results, such as statistical significance, patterns, or trends, without interpreting or explaining their implications (which is reserved for the Discussion section). The text provides a narrative that

complements the tables and figures, emphasising the main points and helping readers understand how the findings relate to the study's research questions or hypotheses.

Rather than repeating all the data shown in tables and figures, the text should summarise the most critical aspects, offering context for the reader to interpret visual data more easily. It also directs the reader's attention to specific aspects of the tables and figures. The text also ensures clarity by explaining any unexpected results or nuances, such as outliers or missing data, making the section informative but concise.

When to report actual results in text format

Report results as sentences within text when the theme they belong to are short enough not to justify making a table or inserting a graph. For example, consider a study where the only demographic data (the theme in this sense is demographics) to be reported is gender. This would not justify a table on its own, so you might write *We studied 45 males and 33 females* as text. Where there is so much information that it becomes very hard to keep track of it all while reading in sentence form, then it is best to use a table. For example, results such as the following are impossible to keep track of when reported in text: *We studied 34 South African males with a mean age of 50.3 (SD 5.4), 25 South African females, with a mean age of 45.7 (SD 4.6), 19 Namibian males with a mean age of 57.3 (SD 6.5), 18 Namibian females with a mean age of 49.9 (SD 6.3), 23 Zimbabwean males …* Such results are best displayed in a table.

Common errors

Common errors in the text are:

Ambiguity or incomprehensibility. You must have your results read by an outside person to confirm that they can follow your results and know what point you are getting across.

Reporting results in text that are too complex to be understood by the reader, e.g., long strings of numbers, possibly each with standard deviation, p-values, etc. These are far more easily understood as a table or a graph.

*Repeating material i*n the text which is already in a figure or table. You can draw attention or contextualise it, but do not duplicate it.

Redundancy. Some examiners will accept phrases such as *20 participants: (12 female, 8 male).* Others will request you to stop at *20 participants (12 female)* on the grounds that it is not necessary to state that 8 were male: this can be calculated by the reader. This applies in tables too. You should decide for yourself how necessary it is to provide both figures in a particular context. Does it really aid understanding?

Discussing the results, when this should be left for the discussion.

Tables

To construct a good table of results, ensure it is clear, concise, and well-organised, allowing readers to interpret the data easily. Give the table a descriptive legend that accurately reflects its content. Organise the data logically, grouping related variables in rows and columns. Use clear, unambiguous labels for both row and column headings, and ensure that units of measurement and statistical notations (e.g., mean, standard deviation, p-values) are included where relevant. Avoid excessive detail—only present the data essential to answering the research questions. Use the legend to explain any abbreviations or specific terms that might be unclear to readers. Finally,

ensure the table is self-standing, meaning that a reader can make sense of it just by looking at the table alone. It should not be necessary to read the text to interpret the table.

Common errors

Common errors with tables include:

Actual mistakes. Wrong results, misplaced decimals. A common error is numbers which differ from those mentioned elsewhere (e.g. you state in your text that you studied 40 patients, but the table says 37, or lists 20 males and 17 females, which add up to 37).

Apparent mistakes. These arise when something is not adequately explained (e.g. you state in the text that you studied 40 patients, but the numbers in the table add up to 37. In this case this is not actually an error: somewhere you have omitted to explain that three patients were excluded).

Missing information. Numbers are given, but no standard deviation, IQR, confidence intervals or p-values where one or more are necessary.

Incomprehensibility. Tables are crowded or poorly constructed, making them challenging to understand.

Redundancy as described above. Do you need a row stating the number of females if you have already provided rows stating the total number of participants and the number of female participants in the table?

Inadequate and wrongly-numbered legends.

Figures

Figures are not used in scientific writing for decoration: they are a means of conveying information about the study and the results. Occasionally a purely illustrative figure enhances the impact of the introduction for a manuscript, e.g. a clinical illustration. The main purpose of a figure is to communicate the study's key findings visually, enhancing the reader's understanding of the data. A good figure should be clear, simple, and directly related to the research questions or hypotheses. The type of figure—whether a graph, chart, or diagram—should be chosen based on the type of data being presented as described below. Ensure that the figure has a descriptive legend and that all axes are clearly labelled with units of measurement, legends, and any necessary statistical markers (such as error bars or confidence intervals). Avoid clutter and unnecessary embellishments; the figure should highlight the most critical aspects of the data. An appropriate figure should complement the text and tables without duplicating information, and it should be easily interpretable by itself, allowing the reader to grasp the main points without needing extensive explanations.

Types of graph

Appropriate graphs can enhance the appearance and comprehensibility of your manuscript. Well-designed graphs are often easier to interpret than tables or text. Bar graphs, line graphs and scatterplots (XY graphs) have specific purposes. *They are not interchangeable*.

- Bar or column graphs are intended for displaying *categorical* data, allowing for easy comparison of the frequency or values across different categories and making them helpful in presenting discrete groups or counts. Changing the graph to reflect percentages rather than numbers or using a “stacked column” chart can make information much more meaningful and easier to interpret. Explore these options and find which works best.

- Line graphs are best suited for illustrating trends over time, as they show the relationship between two variables and highlight changes in values across a continuous scale, making it easier to visualise patterns or trends.
- Scatter plots are used to examine the relationship between two quantitative variables, allowing researchers to assess correlations or patterns in data points, and are particularly helpful for visualising the strength and direction of a relationship between variables.
- Histograms and box-and-whisker plots are best for displaying the spread of results
- There are many other chart types with niche application. Exploring your data in determining which chart type its best is an important part of your analysis.

Common errors

Common errors with figures include:

Actual and apparent mistakes, as described for tables.

Missing information. Graphs which should but do not include error bars (standard deviation, standard error or range).

Irrelevance. Students frequently include graphs just because they have them, even where they are of no value (e.g., where the information is irrelevant to the research question or is already given in text or a table).

Inappropriateness. It makes no sense to use up half a page for a graph when its data are simple enough that they could be reported in a few lines of text.

Amateurish graphs. Keep graphs simple and two-dimensional. Avoid Excel's fancy three-dimensional bar graphs and pie charts. (These are largely for business presentations). Use colour only sufficiently to make meaning clear. The graph is there to convey results, not for decoration.

Missing information on axes (title, scale, units)

Incomprehensibility. The figures are so poorly designed that it is challenging to understand them.

Wrong type of graph for the data. See above.

Inadequate and wrongly numbered legends.

Discussion

Fatal flaws in discussion

The following are serious shortcomings in the discussion that almost always result in the examiners requiring a second examination after corrections.

Superficial discussion. The degree of intellectual engagement with your results (often manifesting in a very short discussion section) is not worthy of a master's degree.

Drawing inappropriate conclusions from your results (e.g., concluding that A is better than B when you failed to show a statistically significant difference between A and B).

Missing interesting and relevant conclusions that your results should lead you to. This often represents intellectual laziness. Students write down their results but cannot be bothered to think deeply enough about what the results are, or could be, telling you. So, they write down something superficial while completely missing the actual value of the results.

Irrelevant discussion. The discussion fails to remain focused on your actual results but moves on to topics not directly related to your results.

Unbalanced and missing discussion. Your study had two aims, or you found two equally important results. You discuss one in great detail and the other hardly or not at all. This is regarded as a serious issue by examiners and frequently leads to a request for re-examination.

General points

Here are some general points about your discussion.

Do not report results for the first time in the discussion. They must appear in the results section.

Do not repeat results reported in the results section in the discussion.

Stay focused: Ensure that the discussion focuses on the study's results and implications.

Do not stray into a discussion of or make recommendations for topics not part of your study. If you studied diagnostic markers for a disease and have useful findings, you can make recommendations for diagnosis. It is inappropriate to offer treatment recommendations. Nor should you be discussing treatment.

Write clearly: Write in clear, concise language, avoiding jargon or overly complex sentences. Ensure that your arguments are logically structured and easy to follow.

Support arguments with evidence: Use citations from relevant literature to support your interpretations and claims. This adds credibility to your discussion and shows how your work fits the larger scientific landscape.

Stay objective: Maintain an objective tone throughout the discussion, even if it is necessary to advocate for the significance of your findings.

Do not overstate the significance of your findings. It is best to remain somewhat guarded. Imagine that you found that 62% of patients improved on treatment A, and 64% of patients on treatment B and the difference is significant. You might write *Our results suggest that there may be some advantage in applying treatment A, although the small difference we noted may not be clinically significant. We believe the result should in any event be replicated in larger studies before a definitive recommendation can be made*. Do not write *We recommend a change in clinical practice such that all patients receive treatment B*. To do so would be to overstate the confidence people should have in your result and the size of the effect it would have if clinical practice were changed.

Laying out the discussion logically

One way (but not the only way) to begin is by *Restating the purpose of the study and its key findings*. This sets the stage for discussing the implications of the results.

Interpret the results: Analyse the findings in detail, discussing what they mean in the context of the existing literature. Address how the results support or contradict previous studies and explain any discrepancies. Merely repeating the results is not discussion.

Consider implications: Discuss the broader implications of your findings for clinical practice, policy, or future research. Explain how your study contributes to the field and what changes it may suggest.

Discuss the limitations of your study: Acknowledge the limitations of your study candidly. Discuss any factors that might affect the validity or generalizability of the results, such as sample size, study design, or potential biases. *Discuss* means *discuss*. You must explain why your study's conclusions remain valid despite the limitations. Do not list limitations just for the sake of doing so (or even make up some). If your study yielded statistically significant results, it cannot have been

underpowered, even if you only had 12 subjects. The sample size was, from the statistical point of view, adequate. In this case, it would be wrong to state that the sample size was too small. You need to think very carefully about this section.

Suggest areas for future research based on your findings and limitations. Highlight unanswered questions from your study and how they could be addressed in subsequent work. Avoid the trite phrase *We recommend that further research is undertaken* unless you are very specific about what direction that research should take.

Conclude thoughtfully: End with a strong concluding paragraph that encapsulates the significance of your findings. Reiterate the main takeaway from your study and its relevance to the field.

References

Start the bibliography (Reference section) on a new page.

Check your bibliography very carefully. Check that all references are present, correctly numbered and in sequence. Ensure that all details are correct. Ensure that the Vancouver system is followed consistently. Check that different reference types, such as journal articles, book chapters, books, electronic articles and websites, are correctly referenced.

It is not uncommon for referencing software to scramble references, such that numbers in the text no longer reflect the actual references in the bibliography. You must check this repeatedly, and as the final last step before submitting your thesis.

How many references should there be?

Journals limit the number of references in a paper. For a manuscript of 5000 words, the limit should be approximately 50 well-chosen references. You had the opportunity in Chapter 1 to prove your understanding of the literature by referencing extensively. *Do not do so here*. Research articles typically allow many fewer references than review articles. Your examiners will judge your manuscript by the appropriateness of your references, not their number. If your paper has been published, your references will be limited to the number allowed by the journal. If it has not been published, approximately 20-30 is usually appropriate. A manuscript representing a review or discussion without original data requires many more. In this case, they may effectively be no limit, provided that everyone you use is relevant, appropriate and adds value to the discussion.

Format

Line spacing 1.15 lines, left-aligned.

APPENDICES

PAGE NUMBERS

Page numbers are optional for the appendices. It is acceptable to stop numbering on the title page of the first appendix. If you know how to superimpose external page numbers on PDF pages, you may do so. It is, however, tricky. You will need to ensure that the superimposed page numbers do not fall on top of the document's internal numbering, and you will have to edit the Table of Contents manually.

LAYOUT

Title page

For each appendix, construct a title page which matches those at the start of chapters 1 and 2.

- Position the text APPENDIX [**number**] halfway down the page.
- On the following line, write the title of the appendix.
- Then, insert the document after this, typically in PDF format.
- Repeat for all appendices.

WHAT TO INCLUDE

Include the following, as appropriate, and in the following order.

- Protocol
- Formal letter awarding ethics approval. Where necessary, Department of Health approval and University approval (e.g. for research involving students).
- Explanatory material for patients and participants (if any)
- Consent forms (if any)
- Published paper as a PDF (if any)
- If you have stated that your manuscript is formatted according to the instructions of a specific journal, include its *Instructions for authors.*
- Data capture sheets, instruments and the like
- Any other relevant material.

NOTES

- Include your protocol and all other material as a PDF. If you insert them as a Word document, they share formatting with the rest of the thesis, resulting in a loss of proper formatting.
- You must include the official approval from Department of Health head office, but you do not need to include approval from hospitals or institutions.