Explanations

**in addition to the template for Bachelor/Master Theses
at the Institute of Biology
of the University of Graz**

February 2024

Dear student,

The template for thesis writing will make it easier for you to structure the content and formatting of your Bachelor/Master Thesis at the Institute of Biology. The template provides a formal framework for your thesis. Your supervisor will help you develop the content and the detailed structure of the thesis.

On the following pages you will find:

A) Instructions for how to use the template
B) A summary of the most important rules for academic writing
C) Information on correct referencing and plagiarism prevention

We hope you enjoy your research and wish you every success in writing your thesis

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General office hours: Wednesday, 10:00 – 11:00 (or individual appointments)

Additional office hours dedicated to questions concerning academic writing: for the summer semester 2024 (Tuesday, 10:00 - 12:00 Uhr): 19.3.; 9.4.; 30.4; 14.5.; 28.5.11.6.; 25.6.; 9.7. (or individual appointments)

It would be helpful if you could make an appointment in advance for your visit to the office hours, but this is not a requirement.

A How to use the template

This template has been designed for theses that focus on primary scientific research (e.g., experiments, observational studies), and follows the typical structure of a scientific research article (Abstract, Introduction, Material and Methods, Results, Discussion, [Conclusions, Outlook]).

If your thesis focuses primarily on literature review or archival research, then this structure may not be suitable, as the typical outline of literature-based research will deviate from the scheme presented here. In this case, you should develop the structure of your thesis with your supervisor, and adapt the template according to your requirements (see section A.4).

In each chapter of this template, you will find a summary of the purpose of the chapter and a list of the required content. These explanatory texts also act as placeholders for your own texts. As you start writing, you will gradually delete the current text and replace it with your own work.

Discuss with your supervisor how to implement the guidelines for each chapter in detail. Also clarify the following points:

- Do you have to/are you allowed to use this template for your work?
- What should you pay particular attention to when writing and formatting your thesis?
- Which citation style should you use for your references?

A.1 General notes on formatting your thesis

By using this template, you will automatically make sure that your thesis is formatted consistently as far as fonts, font sizes, line spacing etc. are concerned (see section A.2). You will still have to pay attention to the following aspects:

- General formatting (neither too loose nor too overloaded)
- Appropriate line and page breaks
- Appropriate positioning of figures and tables (and consistent formatting of figures and tables; see section A.3)
- Writing in full sentences (bulleted lists are rarely used in academic writing)

Also, avoid the following mistakes when formatting your thesis:

- **Incorrect positioning of punctuation marks in the context of the references:** The reference (which is usually put in brackets) is a part of the sentence (fragment) that contains the information the reference refers to. The punctuation mark that ends the respective sentence (fragment) is, thus, always placed after the reference in brackets. There is always a space before the brackets and after the punctuation mark (but no space between brackets and punctuation marks).
- **"Widows" (also referred to as "orphans"):** These typographic terms refer to single lines of text that are separated from the paragraphs that they belong to by a page or column break. Adjust the page/column breaks manually if a widow (orphan) occurs. Text processing software will often adjust the page/column breaks automatically to avoid widows (orphans).

A.2 Formatting the text with "Styles"

Pre-defined styles will help you achieve consistent formatting of your text simply by selecting the text and applying the desired style to it. The first-, second-, and third-order headlines can then automatically be used to generate the table of contents.

Heading (Überschrift) 1: for first-order headlines (Chapter headlines; pre-formatted!)

Heading (Überschrift) 2: for second-order headlines (for sub-chapters)

Heading (Überschrift) 3: for third-order headlines (for further structuring of the sub-chapters, if required)

No spacing (Fließtext): for continuous text without automatic spacing between paragraphs; set in **bold**, <u>underlined</u> or *italics* as required.

Paragraph 1

Paragraph 2

Normal (Fließtext mit Absatz): for continuous text with automatic spacing between paragraphs; set in **bold**, <u>underlined</u> or *italics* as required.

Paragraph 1

Paragraph 2

- Bullet Point List: for bulleted lists

A.3 Figures and tables

Figures and tables are used to display information in a way that will allow the reader to grasp the content without reading the text. This means that the captions have to contain all the information required to understand the figure or table (see below, "Figure and table captions"). Figure/table captions and the descriptions of your work in the main text should complement each other; the main text is never a 1:1 copy of the figure or table captions (also vice versa!). Ideally, however, it should always be possible to understand a figure or table based solely on the caption, without needing to refer to the main text.

You can use figures and tables for two different purposes:

- To provide detailed information on certain aspects summarised in the text (e.g., to visualise datasets, or to provide an overview of the results from an analysis or extensive database search)
- To summarise or visualise complex aspects described in the text (e.g., experimental designs, conceptual diagrams, models etc.)

Size

Figures and tables must provide sufficient space for relevant content. However, in both cases, they should only take up as much space as necessary. The size of figures and tables will, thus, strongly depend on their content. For figures, this means that they have to be large enough so all relevant aspects are clearly visible – including the size of any writing/labelling/symbols that may be part of a figure. For tables, this means that the content of the individual cells has to be as concise as possible (use text sparingly), and that the table width and height are adjusted to legibly fit the content.

Consecutive numbering

Both the figures and the tables have to be numbered consecutively, and the numbering has to correspond to the order in which the elements are referred to in the text (e.g., you should not mention figure 2 in the text before mentioning figure 1). In the case of figures, there is **no differentiation** between different types of figures (such as photos, schemes, and diagrams).

Figure and table captions

In addition to the consecutive numbering, you have to provide further information in the figure/table captions. This information is summarised in **Table 1** – please note that some aspects aspect will not be relevant for every figure/table. The captions will always contain the numbering, as well as a title and a brief description; the rest of the captions will depend on the content of the figure/table.

Table 1: Overview of the elements of the figure/table captions and the correct positioning of these elements.

Element	Figure	Table
Consecutive numbering and title	Underneath the figure	Above the table
Concise description of the content	Underneath the figure after the number and title	Above the table after the number and title
Information on sample size, statistical evaluation, and representation of statistical significance	Underneath the figure as part of the description	Above the table as part of the description
Legend for abbreviations/symbols (if relevant)	Underneath the figure as part of the description	Underneath the table as a "footnote"
Legend for the labelling of the individual panel if a figure is composed of more than one photo/scheme/diagram	Underneath the figure as part of the description	---
Labelling of axes in diagrams	Normally part of the figure	---
Legend for the elements of a figure (if relevant; colour code, symbols, different types of lines etc.)	Normally part of the figure	---
Labelling of columns and lines	---	Part of the table

Symbol: --- means that this aspect is not relevant for this respective type of data representation

References to figures/tables in the text

When writing the text, always refer your readers to the figures/tables showing the details/visualisation of the respective content (data, experimental designs etc.). If a figure/table cannot be placed in the immediate vicinity of the text to which it belongs (i.e., if there is more than one page in between the text and the figure/table), it is helpful to include a reference to the page number where it can be found.

Positioning and line breaks

Every (sub-)chapter headline should be followed by text – figures and tables should not be positioned directly after a headline. The figures/tables should (usually) be positioned in the immediate vicinity of the text that describes the respective content. Make sure that the formatting of the pages is neither crowded nor space-wasting. Large figures/tables should be centred and placed between the paragraphs. Smaller figures/tables are usually aligned with the page margins (left or right); in this case, pay attention to the line breaks around the figure/table and (if necessary) adjust the use of space in the lines manually.

For figures, you can use the "Layout Options" feature (which appears in the drop-down menu when you right-click on the illustration) to control how the illustration fits within the text. For tables, you will find this setting option under "Table Properties" (appears in the drop-down menu when you right-click on the table) on the "Table" tab.

Use of colours in figures and tables

When working with colours, keep in mind that colour should usually not be used as the sole means of conveying information. This is because some people have a limited (or no) ability to see or to distinguish between colours. The red-green contrast is particularly problematic. In most cases, you can easily replace colours by (or supplement them with) other features to ensure that information is conveyed even when colour vision is impaired. You can, for example, use different symbols, hatching/patterns, greyscale, or additional labelling within the figure. If for some reason you can only use colours as an indicator (e. g., maps), then be sure to choose a "colour blind friendly" colour palette. For a detailed guide to accessible colour design in figures, see Roskoski (2017).

A.4 Adapting the structure of the template (e. g., for literature-based research)

You can replace the existing headings and page headers in this template with your own text and add new chapters as required. If you do this, define each chapter as a new "section" by inserting a "Section Break" so that you can change the header content accordingly. Before you change the content of the header of the new section, make sure that you uncouple it from the previous section – if you forget to do this, you will also unintentionally change the content of the header of the previous section.

B Academic writing: The essentials

If you follow certain basic rules when writing your text, it will be more "reader-friendly", i.e., easier to read. The better your text is structured in terms of content and language, the less energy is required to read it comprehensively – and the more energy the reader will have to concentrate on the scientific content of your thesis (Lebrun, 2007).

You have already learned the key concepts of academic writing in the compulsory courses on this topic in the bachelor/master curriculum (Wissenschaftliches Arbeiten: Schreiben und Präsentieren). The following is a summary of the most important rules for reader-friendly academic writing. Details can be found in the course materials for the courses mentioned above or in the relevant specialist literature.

Basic rule # 1: Clear structure and well-thought-out storyline

Your research question is the core of the story you tell in your academic text! All parts of your thesis will serve the purpose of addressing this research question. With the text that you write, it is your job to guide the reader through your work in a way that is as straightforward and as easy to understand as possible. This means that you must present the content of your thesis in a logical order. The same applies to the thesis as a whole, to each chapter, and to each paragraph and sentence within a chapter.

Basic rule # 2: Correct spelling, grammar, and punctuation

Paying attention to linguistic accuracy and correct punctuation is not optional! Mistakes in spelling, typing, grammar, and punctuation not only make your text look unprofessional, but also difficult to read. Also essential is the correct (non-)placement of spaces. The spell-checking and grammar-checking features of your word processing software will help you to spot the most serious errors. It is also advisable to give your thesis to at least one other person for proofreading - you should do this at least for the final (in your opinion) version of your thesis. However, your proofreader(s) should be familiar with the subject and with the technical language and culture of the biological sciences. Tell your proofreader(s) that you only want them to correct spelling, typing, grammar and punctuation, **not** to rewrite the text completely.

Basic rule # 3: Correct use of tenses

Each section of a typical academic paper/thesis is written in a particular tense! In the introduction, use the simple present tense to sum up the current state of research in your field and to present your objectives, research question(s) and hypotheses. Use the simple past

tense/present perfect tense when directly referring to the findings of other studies. In Materials and Methods, use the simple past tense to describe what materials you used and how exactly you carried out your research. In the Results section, use the simple past tense to present the results of your experiments or other findings. Make sure that the results are presented using a continuous and logical flow of text, and try to concentrate only on the most important aspects (you don't need to list every single result in the main text; instead, refer to the tables and/or figures for the details). In the Discussion (and, if applicable, in the Conclusions and the Outlook), you will have to use a mix of tenses for different purposes. Use the simple past tense to refer to your results, the simple present tense to interpret your findings based on the literature, and the future tense to talk about future research and the possible future implications of your work.

Basic rule # 4: Clear structure of the sentences and paragraphs

Structure at the linguistic level is what holds your writing together and makes it cohesive! Make sure to pay attention to the connections between sentences and paragraphs. Always work from the known to the unknown, and be sure to introduce and define technical terms as they arise in your text. In each clause/sentence, take up the content of the previous clause/sentence and then link it to the new content. In this way, the sentences and paragraphs will interlock with each other like the links in a chain. Pay attention to the semantic clarity of the references in your clauses/sentences – it must always be unmistakably clear which term, for example, a pronoun refers to. Similarly, in English language writing, the word "this" should usually be coupled with a specific concept to avoid ambiguity.

Basic rule # 5: Be concise

Get to the point and be precise! Academic writing in the natural sciences is concise; unnecessary embellishment will distract the reader from the content of the text. Avoid "ballast" such as superfluous information, unnecessary detail, and meaningless filler words/phrases (e.g., "actually", "it can be said", "so-called", etc.). When choosing clauses and phrases, make sure to choose the ones that are strongest in the context (you should usually avoid phrases like "it has been shown", that shows", "it can be said that", "it has been found that", etc. - instead, just say, e.g., „these results show"). Be just as careful about your choice of adjectives/adverbs; as a basic principle, only use adjectives/adverbs if they are required to increase the level of precision in your writing. This may also mean saying goodbye to some of your "favourite friends", such as "actually", "basically", "(most) likely", "probably", "essentially", "notably", etc.

Basic rule # 6: Consistent use of technical terms and abbreviations

Technical terms are an integral part of scientific language! There is no way around knowing them and using them correctly. There is no need to avoid word repetition when dealing with technical terms – in this case, the use of synonyms is unnecessary and will disrupt the flow of reading. It makes sense to use abbreviations if certain bulky terms (e.g., names of species, genes, proteins, methods, etc.) will repeatedly occur throughout the text. Once you have introduced an abbreviation the first time it is used (i.e., in combination with the full technical term), you can use it in the rest of your text without having to explain it again (except within captions for figures/tables). An alphabetical glossary of abbreviations is often included in many academic works.

Basic rule # 7: Value-neutrality and sparse use of personal language

The language of science should be as neutral and value-free as possible. Therefore, scientific texts should avoid judgmental formulations and exaggerations. Writing from a personal (I/we) perspective is not welcome in German scientific texts, and is, thus, commonly circumnavigated by using the passive voice. In the English language of science, the personal style is already well established, and most journals actively discourage the use of passive voice. Still, you should make sure not to overuse the personal perspective when writing in English; that is, things that you write about "I" or "we" should be understandable from the perspective of a generic writer or researcher – not only you in particular.

Basic rule # 8: No colloquial language

In an academic text, it is usually a mistake to write something down in exactly the same way as you would express it in your day-to-day speech! Scientific writing is the translation of content and ideas into the language of science. Check each version of your text for colloquialisms and replace them with appropriate standard language.

C Citing/referencing correctly and avoiding plagiarism

The term "citation" refers to the reproduction of the meaning of read content (or other intellectual property of other persons) in combination with an indication of the source(s) used (Referred to as "references"). It is unusual in the natural sciences to use direct quotation (i.e., to use the exact same wording as has been used in the original source). In academic writing, it is imperative to provide references at all times for several reasons (Turabian, 2018):

- Protecting the intellectual property of others (= writing without plagiarism)
- Ensuring the accuracy of the cited content (the readers can go to the original source to check that the content has been cited correctly and can also obtain additional information from that source)
- Connecting your work with the research in your field (based on the research tradition that informed your work, readers will be able to relate your project to the work of the community in your field)
- Helping readers to obtain information in your specific field (your thesis may provide a source of information to others who would like to build on your research)

What to do to keep your text free from plagiarism:

- Always indicate all sources and other tools you used (e.g., AI systems within the scope of permitted use)
- Concerning the use of AI, observe the currently valid guidelines at the University of Graz and the Institute of Biology. Remember that you are responsible for all of the text in your thesis – if you use an AI tool to generate text, and the text fails to include proper citations, then *you*, not the tool, will be leaving yourself open to charges of plagiarism.
- Writing without plagiarism means that you must provide references for any bit of content that is not your own idea. Whenever you paraphrase someone else's intellectual property (i.e., put it in your own words), you must include the appropriate citation(s) immediately after the cited content. There is no rule of thumb for how many references to include in a text. One reference in one place in a sentence/paragraph, several references in one place in a sentence/paragraph, or one or more references in several places in a sentence/paragraph – the number and positioning of the citations depend on the content that is cited.
- For every piece of information that you obtain from the literature and use in your thesis, make sure you put it in your own words. Note: It is not enough to exchange individual words or to slightly rephrase sentences! Also, refrain from literally translating from other

languages. Instead, paraphrase the relevant content of the original source – i.e., summarise the information in your individual academic writing style and add a citation.

If you find it difficult to express content in your own words, this may be an indication that you have not yet understood the content or are not sure how relevant it is to your work. In this case, take a step back, look at the source(s) again and think it through.

- Copying directly from any of reference is plagiarism! This includes copying (literally or content-wise) content from other Bachelor or Master Theses (e.g., from the Introduction) – even if you cite that thesis and/or the references cited therein as (a) reference(s) in your own thesis. If you copy from another student's thesis, you are plagiarising their work – the wording of the copied text is the intellectual property of the student who wrote the thesis. In case you need to use the same information from the literature that you found in another student's thesis, always read the original sources and write your own text based on these sources. This will be relevant if your Bachelor/Master thesis is based on the work of another student and, therefore, requires similar content in the introduction.

Citation styles

In the life sciences, the most common citation style is the author-date style – i.e., the use of parenthetical citations (author[s] and year) in the text to indicate where references have been used (in-text citations), and an alphabetical reference list at the end of the thesis/paper. Some citation styles use endnotes (numerical references in the text and a numbered bibliography at the end of the work). In other scientific disciplines, citing with footnotes is widespread (as is often required in schools for the VWA – roughly equivalent to a high school "senior thesis" or "senior project" in the US education system). However, this citation style is rarely used in biology (or in the natural sciences in general).

There are many variations of the author-date and endnote citation styles that all work according to the same basic principles, but vary strongly in the details (i.e., the formatting). The Institute of Biology does not specify which citation style is to be used for theses. You are free to choose any citation style, unless your supervisor asks you to use a particular style. You may wish to use the American Psychological Association (APA) citation style, 7th edition (APA, 2020), which you have already used in the seminar BIO.402 "Wissenschaftliches Arbeiten – Schreiben und Präsentieren" ("Scientific writing and presenting"). Parts of the APA manual are available free of charge at the following link: https://apastyle.apa.org/style-grammar-guidelines/.

Whatever citation style you use: Reference management software and the associated plugins for word processing programmes will help you to cite sources very efficiently. Many different

citation styles (including the APA style, 7th edition, in German and English) are available as templates in common reference management tools (e.g., in Citavi, which is available at the University of Graz, or the free, open-source reference manager Zotero). This should automatically ensure the correct formatting of the in-text references and bibliography entries.

Caution: Never trust your reference management tool blindly! You must always check your in-text references and reference list for completeness and correct formatting, as even references created with reference management tools can be incorrect (especially in capitalisation and in some details of formatting in the bibliography).

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