GUIDELINES FOR SCIENTIFIC PRESENTATIONS AND PAPERS

— SEMINARS, RESEARCH LABS, BACHELOR AND MASTER THESES —

1. Introduction

Seminar papers, research lab reports, and theses are centred on how to present your insights and work in a scientifically adequate manner. While there are many types of scientific presentations, the two forms of presentations you will encounter are the textual presentation (the seminar paper or thesis itself) and the talks about your text. Preparing these presentations requires respecting regulations and finding a good outline, shaping a story, layout your text, considering page limits, and many other things such as fonts, grammar and orthography, dealing with literature, etc.

This document is a collection of guidelines to help you in preparing and writing a scientific document at the *Artificial Intelligence Group* at the FernUniversität in Hagen; it contains organisational aspects, definitions of some formal stylistic aspects, and specifics on writing. Of course, it is only a starting point, as the web is full of elaborated guides to good scientific presentations and papers and it is expected to read at least two or three of each of these. Some of these guides may contradict somehow with each other and with the recommendations given here. It is up to the student to adopt the guidelines as they seem to fit, but they should be applied consistently. After you have prepared your presentation or written your paper, have another look at this document and those guides and cross-check whether you have followed the recommendations.

The first part of this document is concerned with recommendations and organisational aspects that apply to seminar papers, research lab reports, bachelor and master theses. Specific aspects on theses and specific aspects on seminar papers/research lab reports are discussed at the end of the document.

2. General Remarks

Before starting with anything, we advise you to consult your syllabus's regulations (***Prüfungsordnung***). The regulations tell you many important aspects, especially organisational ones.

2.1. Advice to Organise Yourself

You should plan ahead how you finish your document. Regardless of which project one approaches, the scheduled time is typically not enough. Because of that, we recommend planning with a buffer. The process of reading and understanding the literature and writing is

often underestimated. This is especially true for the time you will need to finalise a thesis. The well-known 80/20 rule also applies to seminar papers, research lab reports, and theses[1].

Because working on a scientific text is stressful and sometimes it is hard to observe the progress, you may struggle to keep up the pace. Because there is no general strategy to apply, this requires finding an individual solution, and we will also have no solution for you here. But, we like to tell you that you are not alone and not the first who encounters this problem. Nearly every student (and researcher) has encountered similar struggles. In case it gets too difficult, we recommend you seek guidance and/or help from your family, friends, colleagues or professionals.

2.2. Feedback from your Supervisor

We are interested in supporting you as best we can. But it is up to you to demand feedback and help. Feedback is given via e-mail or individual meetings, e. g., by a video call. Typically, you can discuss conceptual problems and excerpts of your text with your supervisor. Before contacting your supervisor, prepare yourself by writing down your questions and open problems. Note that the comments by your supervisor are often meant as a suggestion or constructive criticism. It is up to the student to make the best of the criticism received, and we expect that the student can generalise criticism and apply it to the whole text. This means, in particular, that the student should reflect, without being told to, if the received suggestions and criticism apply to other parts of the paper. Also note that it is not the responsibility of your supervisor to proof-read your document. Even if your supervisor tells you that your document looks good, it may happen that the document still contains issues that are only detected in the final assessment.

We advise you to use the opportunity to request feedback for your preliminary texts or presentation slides. If you do so, note that we only accept PDF files. This means, in particular, that we do not accept Office-format files, e.g., docx. Please also ensure that the files you sent to us contain the following:

- your name,
- the program you are enrolled in (German *Studiengang*),
- the title of the work you are sending,
- the date of your work, and
- page numbers.

It is always advisable to send files that have self-explanatory filenames. If the file(s) you are sending to us contain parts that are unfinished and should not be considered by us, please mark them accordingly.

Meet the deadlines! If your advisor asks you to submit preliminary or final versions of presentations or technical reports until a specific deadline, then submit this version until this specific deadline. Ignoring this deadline and submitting your presentation or paper later without notice is unprofessional. It is usually not a problem to ask for an extension, but you should always ask before the actual submission deadline.

[1] `https://en.wikipedia.org/wiki/Pareto_principle#In_computing`

2.3. Good Research Practice – A Note on Plagiarism

In general, you always have to follow the code of conduct for good research practice[2]. In particular, you should make clear what are your own contributions and what is the work of others (see also the remarks on how to refer to work of others below). This applies to the verbatim use of texts, but also applies to minor modifications of texts and the usage of ideas. Plagiarism[3] will lead to an automatic failure and can lead to further drastic consequences, such as expulsion from the university. See the five simple rules to avoid unintentional plagiarism [2].

3. Scientific Writing

A seminar paper or a thesis has the same requirements as any other scientific publication. Simon Peyton Jones [3] guideline for writing scientific publications is highly recommendable. Most of what is said there also applies to technical reports, seminar papers and theses. Besides that you should also take into account the following recommendations.

3.1. Recommendations for the Structure of Scientific Documents

You document should tell a story to the reader that motivates your topic and guides the reader through the text and makes it interesting for the reader[4]. The outline (and content) should be consistent and coherent. In the culture of scientific writing, it is established that you should have an introduction and an conclusion for your text. The following outline is shaped to meet these requirements, and we recommend to use an outline which is inspired by this:

- Title page and abstract
- Table of contents
- Introduction
- Preliminaries
- Main body
- Conclusion
- Bibliography

Note that this outline does not reflect the actual structure of sections of your text. You might have multiple sections for preliminaries, the main body, etc. Even sometimes, it makes sense to choose a different order. In the following, we consider the elements of the outline in more detail.

Title page and abstract. The AIG-thesis template defines your title page. However, a title page generally contains at least the title of your work and your name (and affiliation). The title should be chosen very well to attract the right audience and in a way that it explains what the work contains.

Table of contents. The table of contents presents the logical structure of your document. It provides an impression of what has been done, respectively what the reader can expect to

[2] `https://doi.org/10.5281/zenodo.6472827`
[3] About plagiarism: `http://plagiat.htw-berlin.de`
[4] In Germany, there is the metaphor „*Roter Faden*“

obtain. It is important to choose concise titles for your chapters, sections and subsections such that they summarise their respective content. Please avoid abbreviations in titles, as abbreviations are only valued by the reader when they stand for something known, e.g., the abbreviation "NP" in the title "NP-completeness of the Emptiness problem". The order of elements has to be chosen reasonably. The elements of your table of contents should be numbered. Do not present the titles of sections with an arbitrary depth of nesting. Presenting sections and subsections is usually enough (and not presenting subsubsections, etc.). When dissecting your text into segments, avoid singular items, e.g., when you have a section 2.1, you should also have a section 2.2. When doing so, the table of contents is a (rooted) tree of section titles, where every inner node has at least two children. Content-wise, more deeply nested elements in this tree contain more specific information that fits the titles of their respective parent elements.

A table of contents is required for longer documents such as bachelor and master theses, but should be omitted for shorter documents such as seminar papers.

Introduction. This part motivates your whole document. You describe your goal and research questions on a (semi-)informal level. To do so, you have to present to the reader information on the research area and how your goals and questions are connected to the state of the art. You explain what you will do in your paper and how; furthermore, you explain why your work is relevant. At the end of your introduction, you describe how your document is organized textually. Keep the language in this part such that a non-expert in the field can (roughly) understand the goals and approaches of your text.

Preliminaries. The preliminaries introduce the research context of your document and the general prior work you make use of. You describe the theories and methodologies on which your work is built upon. Also, priorly existing algorithms and results you will make use of later will be presented here. Ensure that the preliminaries focus on the relevant aspects and keep an appropriate weight in the presentation. While it is often advisable to repeat basic results if they are only of marginal importance for your contributions, they should be presented only briefly. In contrast, when your contributions heavily use results from the literature, you should explain these results in detail.

Main body. Your contributions are presented in this part of the document. The actual content depends largely on the topic of your text. Please ensure that a reader can identify your contributions. We advise you to split the main body into chapters/sections so that each chapter is a logically closed unit about one technique. For instance, when your text describes an implementation, provide a section where you describe the problem and its formal properties; in another section, you explain on a high level the implementation approach for the considered problem; in the next section, you explain what your actual implementation does, the design choices and reasons for choosing a certain technology; the evaluation of your implementation gets another own section.

Conclusion. In this part, you revisit the paper's outline and summarise concisely the most important contributions of your document. It is advisable to connect your results with the research questions given in the introduction. Discuss relevant related work and potential future research questions and research problems that can be addressed in future work.

Bibliography. In this part you list all literature your paper makes use of. Note that you should only include references that are actually referenced in the text. Take care that all references are complete (Authors, title, year of publication, publisher, etc.). Find further information on citing below.

3.2. Writing, Language and Style

In this section, we give you general advices on writing.

Correct Language. We expect that you will use correct English and/or German. Too many spelling and grammar mistakes in a paper are in no way acceptable. Papers that do not conform to standards required by high-school graduates are rejected without review. If you are not a native speaker ask a friend to proof-read your paper and always use automatic spell checkers.

Good Language and Style. Besides writing correct English and/or German it is also expected that you write *good* English and/or German. In particular, respect the following remarks:

- Paragraphs are comprised of a beginning, a main part, and an end.
- Chapters start with an overview and end with a summary and some conclusion
- Never have two consecutive headings without text between them.
- Abbreviations such as AI (Artificial Intelligence) are always explained at their first occurrence and marked as such using uppercase letters.
- Foreign words are marked as such by italics. Example from above: "... consider your *Prüfungsordnung* (syllabus's regulations)".
- Use the correct quotes, e. g., "these are English quotes" and „*dies sind deutsche Anführungszeichen*".
- Words such as "which"/"that" and "when"/"if" are used in the correct context.
- Terms such as "don't", "wasn't", and "can't" are to be avoided, use "do not", "was not", and "cannot" instead.
- Avoid using ampersand "&", as "&" has a very specific semantics[5]. In particular, one should not use the ampersand sign for simply replacing the word "and".
- Sentences are neither too simple nor too complicated.
- Examples should be given when it helps the reader; examples should be given as often as possible.
- The word "section" (and also "chapter", "example", etc.) is written in uppercase whenever followed by a number: "more details can be found in Section 2" but "more details can be found in the next section".
- In-text references such as "*this* algorithm has linear runtime" are only valid within the same paragraph. If you want to refer to the previous paragraph write "the algorithm described above has linear runtime" and if you want to refer to some earlier part write something like "the algorithm described in Section 3 has linear runtime".

Academic Writing. Please consider some general advice on academic writing:

- Use a clear, simple and accurate language. Although you are supposed to present the content in an enjoyable way, a scientific work is not a novella.
- You should be objective in your discussions.
- When writing English texts, use the *Oxford comma*[6].

[5] `https://en.wikipedia.org/?title=Ampersand#Usage`
[6] `https://en.wikipedia.org/wiki/Serial_comma`.

- You should explain important concepts and approaches and not just describe them. For example, the statement "Propositional logic is a formalism for representing logical relationships that allows the inference of new information" is a description. The statement "Propositional logic is defined by two components, a syntax and a semantics. The syntax is built on a signature, a set of atomic propositions, and connectives $\wedge$, $\vee$, $\neg$ that allow the construction of complex formula via the following rules ..." is an explanation. You always have to describe what you are talking about and all things that are important for your report have to be explained (also with examples).
- Repetitions in the sense of explaining again are appreciated. It helps the reader to understand your text without browsing your text.
- Avoid rhetorical questions and do not include (silly) jokes in your text. As the computer science community is international, there is very likely someone who does not get it.
- Each figure has to be referenced as least once in the text. It is mandatory for figures to have a caption that explains what the figure contains and how to read the content. This applies also to tables.

Mathematical Writing. Please consider some remarks on mathematical writing:

- In mathematical writing, "we" is often used in the meaning of "the reader and the author", e. g., "in the following, we consider the deduction theorem of first-order logic". This is absolutely appropriate and we advice you to use it for you text. Be careful, as this has to be distinguished from other usages of "we". For instance, in the sentence "in the following, we present the deduction theorem of first-order logic" we refers only to the authors. The usage of "I" is very uncommon in computer science and we recommend not to use "I" in scientific texts.
- Do not intermingle the meta-language with the language of formulas. For instance, do not write "$\forall A$ with $C = A \cap B$, there $\exists x$ such that $x \in C$." and write instead "forall sets A with $C = A \cap B$, there exists some x such that $x \in C$".
- Avoid formulas at the start of a sentence.
- Avoid consecutive formulas. For instance, instead of writing "We obtain that for A $x \in A$ holds", rather write "We obtain that $x \in A$ holds for A".
- Ideally, definitions, propositions and theorems are written in a way such that they are understandable without reading the surroundings. Especially, all mathematical objects used are denoted and defined explicitly. Furthermore, definitions, propositions, theorems and proofs should not contain explanations or other superfluous content.
- It is common practice in mathematical texts to present formal results in the following order: intuition, definition, proposition, and proof (and examples).
- Be consistent and coherent in the mathematical notation and definitions you use and how you formalise mathematical content. Especially when you are using work from others, we expect that your text aligns used content with the notions used elsewhere in your text. Furthermore, your text should establish and respect conventions. Especially do not use the same symbol or variable for different mathematical objects. For example, do not use A to denote a set in one sentence and use A to denote a formula in another sentence.

Find more on mathematical writing, e. g., in the text by Knuth et al. [1].

LaTeX. The document system LaTeX supports you in writing good documents.

- If you are using LaTeX for the first time, you should read a couple of beginner's guides from the web.
- Use LaTeX environments for examples, definitions, and theorems.
- Use ' instead of ‘ for contractions: "the agent's action" instead of "the agent‘s action".
- A new paragraph is introduced by an empty line, do not use \\ for manual line breaks.
- Use the `\label{...}` and `\ref{...}` features from LaTeX whenever possible. Instead of writing "the algorithm described in Section 3 has linear runtime", label your algorithms and write "Algorithm 3 has linear runtime".
- Only include high-quality raster graphics in your document or, even better, only use vector graphics. The best results are obtained by drawing figures directly in LaTeX, e. g., PGF/TikZ is great for preparing figures.

Further recommendations. Please also consider the following recommendations:

- Do not include concrete programming code in your document. Algorithms are better explained using pseudo code and (detailed) examples. If an implementation is part of the contribution of your document, make the code available online (e. g., in a dedicated GitHub repository) and link to it from the document.

3.3. Citing and References

Appropriately citing works of yourself and others is an important academic writing task. The bibliography section at the end of your document contains the list of works you use. Your text's body only contains citation marks, which refer to the corresponding entries in the bibliography. LaTeX supports you in this activity with the tool BibTeX. Please use one of the following citation styles for your text: a numerical reference style, i. e., the reference is a numeric number, e. g., like [1], or the style "alpha", i. e., abbreviation of authors names and year or the cited work, e. g., the entry [2] would be presented as [OSE13].

There are different types of citations. In computer science, verbatim citations are unusual and should be avoided. However, if a verbatim quote must be given, the use quotation marks is required; citations with multiple lines are indented. The most common type of citation applies when using a result from the literature. Citation references should be put on the corresponding location and are *never* put outside of sentences, which means if they are at the end of a sentence, they are put before the period. Strictly saying, references are not part of the text, and consequently, sentences cannot refer to references. Because of that, we recommend avoiding writing something like "In [1] it was shown that", and write instead something like "Knuth et al. [1] showed that ...". In computer science, it is also common to present well-known facts together with the citation reference, without naming the author(s), e. g., "SAT is an NP-complete problem [13]." Here are two example sentences with citations:

> *We will now consider a basic result from type theory which has many applications in computer science [12,48]. The following theorem was first proven by Church [8] and contains severeal insights given at first by Turing [27].*

The content of the bibliography is determined by the type of work cited, and BibTeX usually takes care of these aspects — however, we advise you to read an online guide on that topic. The following lists two exemplary bibliography entries of journal articles:

[8] Church, A., 1940, “A formulation of the simple theory of types,” Journal of Symbolic Logic, 5(2), pp. 56–68.
[27] Turing, A. M., 1948, “Practical forms of type theory,” Journal of Symbolic Logic, 13(2), pp. 80–94.

You should not copy parts of text from other works. However, especially for background chapters, you might take inspiration from some specific work. In such cases do **not** add a reference on each line. Instead, you should start the corresponding paragraph or section with something similar to “The following introduction on propositional logic is inspired by the presentation of Beierle and Kern-Isberner [8]”.

4. Scientific Talks

Giving talks is part of academic culture to communicate research results. In the following, we give you general advice on preparing a scientific presentation.

4.1. General Structure of Talks

Every scientific talk, independently of whether it is a conference talk or a student talk, should contain the following sections (in that order):

First slide. The first slide should at least state your name and the title of the presentation. It should also contain the date and the venue (i. e., the occasion for the talk).

Motivation. What is the motivation of the work you are going to present in this talk? What problems are addressed? The motivation of a talk should be the given in the first 1–2 slides of the presentation and should even come before a table of contents. A table of contents can even be omitted for small talks (10–15 minutes), but a motivation is mandatory.

Preliminaries. What does the audience need to know in order to understand your talk? Know your audience and know the topics of the talks that are given before your talk. It is quite boring for the audience if you repeat the same background knowledge as the previous speaker. Try to avoid giving too much and obvious background but also do not expect that the audience knows the background as well as you do.

Main Body. The main part of your talk, which may be partitioned into several sections.

Summary. The last slide of your presentation should always be a summary slide that gives a brief overview on what you talked about. This slide can be used by the audience to remember questions they may have had during your talk but forgotten. A slide containing only “Thank you for your attention” is completely useless. However, you should add a “Thank you” note on your summary slide that you reveal when you have finished your summarisation. Then it is also clear for the audience that you have finished your talk.

If you have referenced a lot of other people’s work in your presentation it is also advisable to have a bibliography slide as a backup. Put it after the summary slide but only reveal it if questions regarding the literature arise. Furthermore, you can also prepare an appendix containing slides that will support you in answering potential questions from the audience. Typical content for the appendix is slides with detailed definitions, figures, details of results or additional results, like theorems or data.

4.2. Remarks and Recommendations

A talk should be held in one's own words and one should speak freely; it should not be a simple report of written work. In many cases, it is advisable to deviate from the structure of the presented work. In particular, as you probably use more than one original paper in your presentation you should align notation and background as much as possible in order to have a coherent slide deck.

When preparing your talk and during your presentation please keep in mind the following recommendations:

- A scientific presentation is not simply a paper in presentation style. Do not overload your slides with text but better use simple statements, keywords, and (most importantly) give a lot of examples to illustrate ideas. Use large fonts and split slides into multiple slides if needed.
- Try to be as informal as possible and focus on conveying the central ideas of the topic to the audience. Sometimes it is necessary to add mathematical definitions and notation in order to explain some needed technicalities, but you should be careful with that.
- For each proper[7] slide you should allocate about 2–5 minutes. If you are too fast, the audience will not have enough time to understand the topic of the slide. If you are slower, then you might bore the audience with your too-detailed explanations.
- Practice your talk at least twice and adjust the content depending on your time limitations. If you have been allocated a 30-minute talk but are still not finished at 40 minutes, you only show that you have not prepared yourself adequately.
- Speak loud and clearly.
- Do not read the slides aloud and do not read your notes aloud. Your eyes should be at the audience most of the time.
- Do not stand between your audience and the projection screen.
- At the beginning of your talk make clear whether you accept interposed questions or not. If someone asks a question anyway, be polite and answer it as briefly as possible.
- Do not copy and paste images of formulas, tables, or other text elements that can be written by yourself (especially if they are in a different language).
- Special effects often do not add value to your slides. For example, when you want to hide some parts of a slide do not blur them but hide them completely. The rationale is that tour audience will always try to read what to want to hide from them, this is an unavoidable human reaction.
- Add slide numbers to your slides. This makes it easier for the audience to refer to a specific slide later in the discussion phase.
- Do not add programming code to your presentation. If you are presenting an algorithm, simplified pseudo code and examples are sufficient.

[7] By that, we mean slides that are not organisational, e.g., title slide, table of contents, etc

5. Bachelor and Master Theses

If you are interested in writing a thesis with the *Artificial Intelligence Group*, please have a look on the AIG webpage[8]. Note that a necessary requirement for writing a thesis with the *Artificial Intelligence Group* is that you have participated and successfully finished at least one of our courses[9].

In the following sections, we consider organisational aspects that apply to theses and some aspects of writing a thesis.

5.1. Typical Procedure

Figure 1 provides the typical process for writing a thesis at the *Artificial Intelligence Group*. After you agree with your supervisor on a thesis topic, your supervisor will typically instruct you to prepare an thesis proposal document. After finishing the proposal document, an introduction talk is scheduled in the weekly seminar (called the *Oberseminar*) of the *Artificial Intelligence Group*. At the same time, you will officially request to register your thesis at the examination office. Together with the permit for writing the thesis you obtain the official time limit determined for your thesis. You will present in the *Oberseminar* what you are planning to do in your thesis. After that, you will work on your thesis. We recommend making an agreement with your supervisor on how to exchange information and how to obtain feedback. When the thesis is finalised, you submit your thesis. When your thesis is submitted, you contact your supervisor and ask to schedule a presentation of your results in the *Oberseminar*. Successfully presenting your thesis is the last component of the "thesis module". Two reviewers will write reports and grade your thesis.

5.2. Directives for Writing a Thesis at the Artificial Intelligence Group

The writing of a thesis at the *Artificial Intelligence Group* is regulated as follows. If not agreed otherwise, the proceedure is as decribed as in Section 5.1. When communicating with your supervisor, please respect the remarks from Section 2.2. Other aspects are listed in the following:

German vs English. You can write your thesis in German or English. In any case, the thesis proposal document should be written in the same language as you write your thesis. Whether you write your thesis in German or English, the introductory talk on your thesis in the *Oberseminar* has to be in English and your final talk in the *Oberseminar* should be in English. See also the corresponding section above.

Be aware that English is the scientific language of computer science. Consequently, the relevant literature you will read for your thesis is written in English, and the terminology of the research area is only available in English. In addition, some of your professional contacts in the future will likely be in English. For this reason, we would like to encourage you, especially if you are enrolled in a Master's program, to consider writing your thesis in English.

Usage of LaTeX. We require that you write your thesis with LaTeX. The *Artificial Intelligence Group* group provides a LaTeX-template for bachelor and master theses:

`https://github.com/aig-hagen/aig-templates/tree/master/AIG_paper`

[8] `https://www.fernuni-hagen.de/aig/lehre/abschlussarbeiten/index.shtml`
[9] `https://www.fernuni-hagen.de/aig/lehre/lehrveranstaltungen/index.shtml`

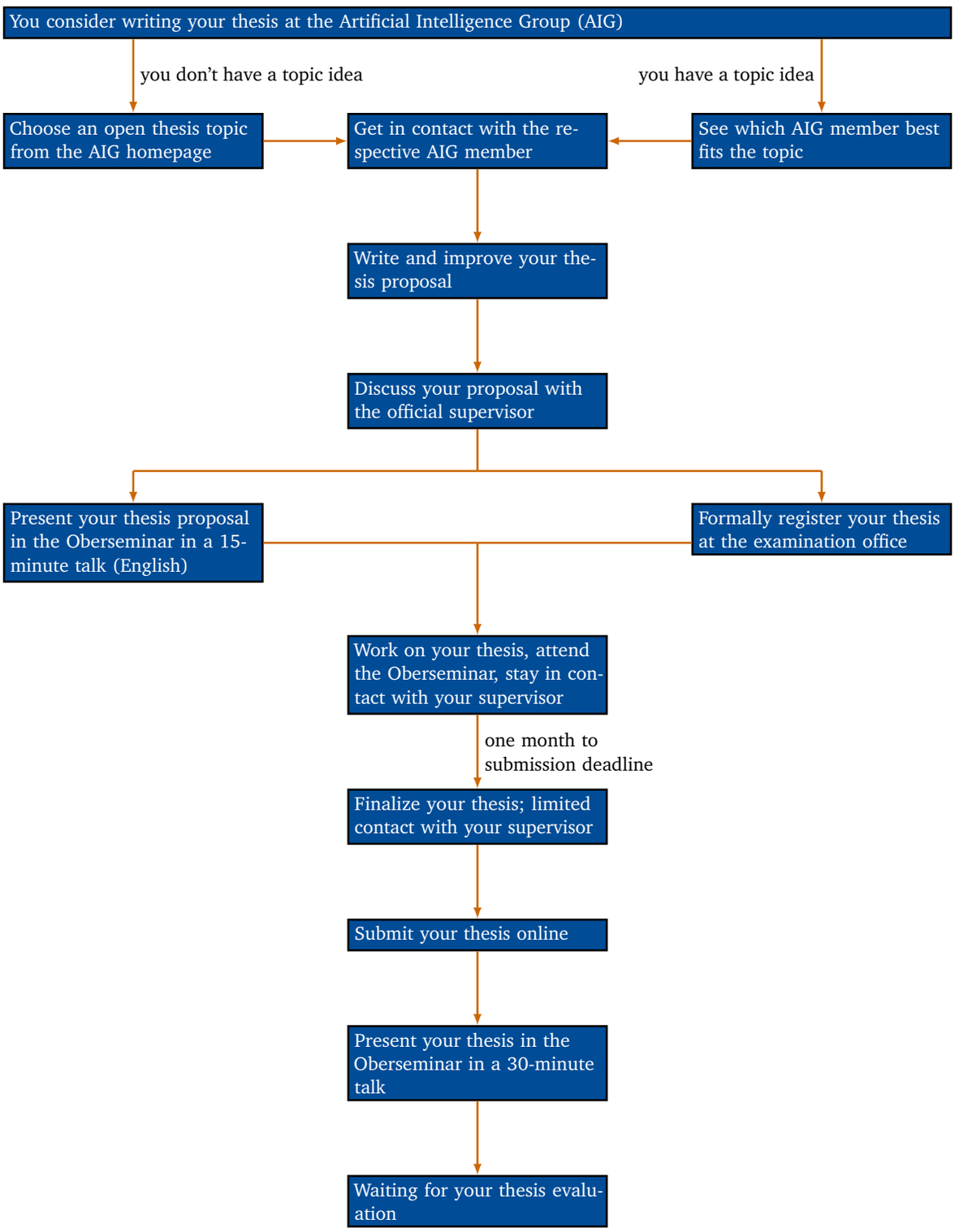

Figure 1: Course of action when writing a thesis at the Artificial Intelligence Group.

It is mandatory that you write your thesis using this LaTeX-template.

Talks in the Oberseminar. When you are writing a thesis at the *Artificial Intelligence Group* it is mandatory to give talks of your thesis topic and your results. These talks will be presented in the *Oberseminar* of the *Artificial Intelligence Group*. We summarise the remarks on talks for your thesis:

- It is recommended that you give an introductory talk and required that you give a talk after finishing your thesis.
  - The introductory talk is **15 minutes** long. This talk should give the audience an overview on the context, what is the research question and what do you plan to do. The introductory talk must be given in English.
  - The talk on your finished thesis is **30 minutes** long. This talk should give the audience an overview on the context, what is the research question, what has been achieved and how you achieved this.
- Contact our secretary's office to schedule your Oberseminar talks.
- Your supervisor will include you to the weekly *Oberseminar*. We do not want to oblige you to join the Oberseminar, however, we strongly recommend to you to join the *Oberseminar*, whenever it is possible for you.
- We provide you with a LaTeX-template for your presentations that shall be used:

  `https://github.com/aig-hagen/aig-templates/tree/master/AIG_beamer`

5.3. Remarks on Writing Theses

Apart from the recommendations given above on writing scientific texts, we have the following advice for you.

Finalisation and Time. Typically, a thesis is a longer document. Consequently, finalisation and writing take much longer than finalising a seminar paper. Because of that, you have to plan more ahead.

Scientific Contributions. With your thesis, you will demonstrate your ability to work on a research problem with the tools and knowledge you learned. A more or less special aspect (in comparison to other modules) of thesis writing is producing a scientific contribution, which is especially important for master theses. There are many types of contributions your thesis might contain and in the following, we list potential contributions:

- comprehensive and insightful summarisation of the state-of-the-art
- identification of research questions and problems
- instantiations and implementations of approaches
- new theorems with their proofs
- new concepts and/or algorithms for dealing with problems
- rigorous evaluations
- and many more.

Being aware of your own contributions and letting the reader know about them is an aspect of academic writing. We encourage you to highlight your contributions in the text, and also in the abstract, the introduction or the summary of your thesis.

5.4. Evaluation criteria

The evaluation criteria of both bachelor and master theses are first and foremost presentation quality, formal accuracy, and scientific rigor. Since a thesis is a scientific publication, it is expected that it also provides a scientific contribution. However, since results of a thesis are not easily predictable, even a negative result (such that a particular formal approach does not work) may be a plausible outcome for a thesis, if it is presented in a scientifically objective manner. More concretely, a thesis will be evaluated using the following *seven* assessment criteria:

1. **Knowledge and skills**: has previous research been understood and explained in a good manner? Were mathematical and other tools used in a professional way?
2. **Language and spelling**: is the language scientifically accurate and appropriate? Is the text well-written and without grammatical errors?
3. **Structure and form**: is the thesis well-structured and easy to follow? Is the typesetting professional and the story-line clear?
4. **Scientific context**: is the work correctly situated in the scientific context and are related works cited properly? Is the bibliography complete and well-organised?
5. **Scientific methodology**: are formal results proven in a mathematically correct manner? Are experiments described in detail and results discussed objectively?
6. **Quality of results**: did the expected results match the promised work from the thesis proposal? Do the results constitute an interesting scientific publication?
7. **Oral presentation**: has the thesis been well-presented in the oral examination? Could the candidate answer questions in a satisfactory manner?

The assessment criteria are identical for bachelor and master theses. However, a master thesis is expected to provide a deeper analysis, a more thorough discussion of the thesis topic, and, in particular, some measurable scientific contribution. A good bachelor thesis, on the other hand, can also "just" be about implementation and evaluation of already existing scientific contributions.

For evaluating bachelor and master theses we are using the evaluation sheet given in Appendix A (in German). This sheet contains detailed information on the concrete evaluation criteria.

6. Seminars and Research Labs

In the seminars of the *Artificial Intelligence Group*, you will get a research topic on which you will write a seminar paper and give a talk on. Research labs additionally include some form of practical aspect and group work. A seminar and a research lab typically consist of an initial meeting, a working phase, and the final presentation.

Initial meeting. This meeting will provide you with the most important dates and basic regulations of the seminar/research lab. After this meeting, you will get your seminar/research lab topic.

Your paper. During the working phase, you can ask the seminar/research lab organiser for feedback on you paper. Please make use of this opportunity to obtain feedback.

We require that you write your papers with LaTeX. The *Artificial Intelligence Group* group provides a LaTeX-template for seminar papers and research lab reports:

`https://github.com/aig-hagen/aig-templates/tree/master/AIG_paper`

It is mandatory that you write your documents using these LaTeX-templates.

Presentations. For passing the seminar/research lab, it is mandatory that you will give an oral presentation on your topic and that you visit all presentations of the other students participating in the seminar/research lab. Usually, the presentations will be given only via Zoom. The initial meeting will provide you with dates when the presentations take place. The *Artificial Intelligence Group* provides a LaTeX-template for presentations that shall be used for presentations:

`https://github.com/aig-hagen/aig-templates/tree/master/AIG_beamer`

Evaluation criteria. The evaluation criteria of both seminars and research labs are first and foremost presentation quality, formal accuracy, and scientific rigor.

For seminars, you will receive a separate grade for the presentation and the paper, the final grade is the *average* of these two grades (rounded to the next valid better grade).

For research labs, the whole student group receives a separate grade for their presentation(s) and the paper, the final grade of the group is the *weighted average* of these two grades (rounded to the next valid better grade), where the grade for the paper counts with a factor of 2. Note that the grade of the paper also implicitly includes an assessment of the implementation work that is described in the paper. Each student receives as her/his final individual grade the grade of the group, but if a student performed significantly above or below the group average, her/his grade may be slightly changed from the group grade.

For evaluating presentations and papers we are using the evaluation sheets given in Appendix A (in German). These sheets contain detailed information on the concrete evaluation criteria.

References

[1] Donald E. Knuth, Tracy Larrabee, and Paul M. Roberts. Mathematical Writing. 2005, `https://jmlr.csail.mit.edu/reviewing-papers/knuth_mathematical_writing.pdf`

[2] H. Ober, S.I. Simon, and D. Elson. Five simple rules to avoid plagiarism. Annals of Biomedical Engineering, 41, 2013.

[3] Simon Peyton Jones. How to write a great research paper, 2016. University of Cambridge, `https://www.youtube.com/watch?time_continue=1&v=VK51E3gHENc`.

A. Evaluation sheets

FernUniversität in Hagen

Fakultät für Mathematik und Informatik

Lehrgebiet Künstliche Intelligenz

FernUniversität in Hagen // 58084 Hagen

Auskunft erteilt:
PERSON
Universitätsstr. 21, Gebäude 3
58084 Hagen
Fon: +49 2331 987-3004
EMAIL

Prüfungsamt
Fakultät für Mathematik und Informatik

25. März 2025

Gutachten über die Masterarbeit/Bachelorarbeit

„TITLE“

von NAME

Inhalt

Textliche Bewertung des Inhalts

Form

Textliche Bewertung der Form

Darstellung

Textliche Bewertung der Darstellung

Kolloquiumsvortrag[1]

Kommentare zum Kolloquiumsvortrag

[1] Hinweis: Die Qualität des Kolloquiumsvortrags fließt nicht formal in die Bewertung der Arbeit ein.

Zusammenfassung und Fazit

Evaluationskriterium	Punkte									
	1	2	3	4	5	6	7	8	9	10
Inhalt										
I1 Inhaltliche Kompetenz										
I2 Wissenschaftliche Kompetenz										
I3 Qualität der Ergebnisse										
I4 Einführung und Motivation									-	-
I5 Literatur							-	-	-	-
Form										
F1 Allgemeine Struktur										
F2 Beispiele										
F3 Formale Korrektheit										
F4 Bibliographie					-	-	-	-	-	-
F5 Visualisierungen					-	-	-	-	-	-
Darstellung										
D1 Sprache							-	-	-	-
D2 Satz							-	-	-	-
D3 Rechtschreibung							-	-	-	-

Gesamtpunkte: X

0-49 Punkte:	5.0	60-64 Punkte:	3.3	75-79 Punkte:	2.3	90-94 Punkte:	1.3
50-54 Punkte:	4.0	65-69 Punkte:	3.0	80-84 Punkte:	2.0	95-100 Punkte:	1.0
55-59 Punkte:	3.7	70-74 Punkte:	2.7	85-89 Punkte:	1.7		

SIGNATUR

NAME

Erläuterungen zu den Evaluationskriterien

I1 Inhaltliche Kompetenz: Thema wurde verstanden und konnte gut wiedergegeben werden

I2 Wissenschaftliche Kompetenz: Formale Aspekte wurden verstanden und konnten gut wiedergegeben werden; die wissenschaftliche Methodologie wurde klar

I3 Qualität der Ergebnisse: Die Aufgabenstellung wurde adäquat bearbeitet und die im Exposé anvisierten Ziele wurden erreicht; die Ergebnisse wurden wissenschaftlich objektiv diskutiert

I4 Einführung und Motivation: Die Einleitung führte adäquat in die Thematik ein und das Thema wurde gut motiviert

I5 Literatur: Vorherige Literatur wurde gut recherchiert und wiedergegeben; die Arbeit ordnet sich gut in die Hintergrundliteratur ein

F1 Allgemeine Struktur: Ausarbeitungsstruktur entspricht der Vorgabe; weitere Struktur ist plausibel und nachvollziehbar

F2 Beispiele: Ausreichend viele Beispiele verdeutlichen die formalen Inhalte

F3 Formale Korrektheit: Mathematische Aussagen wurden korrekt und vollständig dargestellt, Definition waren klar nachvollziehbar

F4 Bibliographie: Vorarbeiten sind entsprechend zitiert, das Literaturverzeichnis ist ordentlich

F5 Visualisierungen: Komplexere Sachverhalte wurden anschaulich visualisiert

D1 Sprache: Die Sprache ist wissenschaftlich, mathematische Ausdrücke sind wohlgeformt

D2 Satz: Das Seitenlayout ist ansprechend und LaTeX-Umgebungen werden passend benutzt; der Drucksatz ist professionell

D3 Rechtschreibung: Die Arbeit ist frei von Rechtschreib-, Grammatik- und Satzfehlern

Dokumentversion 1.1, 25.03.2025

Lehrgebiet Künstliche Intelligenz

Kurzgutachten - Präsentation

Prüfling: Bachelor: Master:

Lehrveranstaltung: Datum:

Erstprüfer: Zweitprüfer/Beisitzer:

Evaluationskriterium	Punkte									
	1	2	3	4	5	6	7	8	9	10
Inhalt										
I1 Schwerpunktsetzung										
I2 Inhaltliche Kompetenz										
I3 Wissenschaftliche Kompetenz										
I4 Diskussionsrunde						-	-	-	-	-
Form										
F1 Allgemeine Struktur										
F2 Beispiele										
F3 Folienlayout									-	-
F4 Formale Korrektheit						-	-	-	-	-
F5 Visualisierungen						-	-	-	-	-
Darstellung										
D1 Orale Wiedergabe									-	-
D2 Zeitmanagement						-	-	-	-	-
D3 Foliensprache						-	-	-	-	-
D4 Rechtschreibung						-	-	-	-	-
Sonstiges										
S1 Sonstige Beteiligung					-	-	-	-	-	-

Anmerkungen:

Gesamtpunkte: Note:

0-49 Punkte:	5.0	60-64 Punkte:	3.3	75-79 Punkte:	2.3	90-94 Punkte:	1.3
50-54 Punkte:	4.0	65-69 Punkte:	3.0	80-84 Punkte:	2.0	95-100 Punkte:	1.0
55-59 Punkte:	3.7	70-74 Punkte:	2.7	85-89 Punkte:	1.7		

Erläuterungen zu den Evaluationskriterien:

I1 Schwerpunktsetzung: Der Präsentationsschwerpunkt wurde gut gewählt und begrenzt, das Thema war plausibel für die Präsentation

I2 Inhaltliche Kompetenz: Thema wurde verstanden und konnte gut wiedergegeben werden

I3 Wissenschaftliche Kompetenz: Formale Aspekte wurden verstanden und konnten gut wiedergegeben werden; die wissenschaftliche Methodologie wurde klar

I4 Diskussion: Fragen wurden in der Diskussionsrunde zufriedenstellend beantwortet

F1 Allgemeine Struktur: Präsentationsstruktur entspricht der Vorgabe; weitere Struktur ist plausibel und nachvollziehbar

F2 Beispiele: Ausreichend viele Beispiele verdeutlichen die formalen Inhalte

F3 Folienlayout: Die Folien sind ansprechend gestaltet, enthalten nicht zu viel und nicht zu wenig Informationen

F4 Formale Korrektheit: Mathematische Aussagen wurden korrekt und vollständig dargestellt, Definition waren klar nachvollziehbar

F5 Visualisierungen: Komplexere Sachverhalte wurden anschaulich visualisiert

D1 Orale Wiedergabe: Die Präsentation wurde deutlich und klar durchgeführt; Sachverhalte wurden korrekt wiedergegeben und Folieninhalte gut erklärt

D2 Zeitmanagement: Die vorgegebene Zeit wurde eingehalten; Zeiteinteilung über die Inhalte war angemessen

D3 Foliensprache: Sätze und mathematische Ausdrücke auf den Folien sind wohlgeformt und gesetzt

D4 Rechtschreibung: Die Folien sind frei von Rechtschreib-, Grammatik- und Satzfehlern

S1 Sonstige Beteiligung: Es wurde sich auch außerhalb der eigenen Präsentation an der Lehrveranstaltung beteiligt

Lehrgebiet Künstliche Intelligenz

Kurzgutachten - Ausarbeitung

Prüfling: Bachelor: Master:

Lehrveranstaltung: Datum:

Erstprüfer: Zweitprüfer/Beisitzer:

Evaluationskriterium	Punkte									
	1	2	3	4	5	6	7	8	9	10
Inhalt										
I1 Schwerpunktsetzung										
I2 Inhaltliche Kompetenz										
I3 Wissenschaftliche Kompetenz										
I4 Einführung und Motivation									-	-
I5 Literatur						-	-	-	-	-
Form										
F1 Allgemeine Struktur										
F2 Beispiele										
F3 Formale Korrektheit										
F4 Bibliographie					-	-	-	-	-	-
F5 Visualisierungen					-	-	-	-	-	-
Darstellung										
D1 Sprache						-	-	-	-	-
D2 Satz						-	-	-	-	-
D3 Rechtschreibung						-	-	-	-	-
D4 Layout und Seitenzahl					-	-	-	-	-	-

Anmerkungen:

Gesamtpunkte: Note:

0-49 Punkte:	5.0	60-64 Punkte:	3.3	75-79 Punkte:	2.3	90-94 Punkte:	1.3
50-54 Punkte:	4.0	65-69 Punkte:	3.0	80-84 Punkte:	2.0	95-100 Punkte:	1.0
55-59 Punkte:	3.7	70-74 Punkte:	2.7	85-89 Punkte:	1.7		

Erläuterungen zu den Evaluationskriterien:

I1 Schwerpunktsetzung: Der Ausarbeitungsschwerpunkt wurde gut gewählt und begrenzt, das Thema war plausibel für die Arbeit
I2 Inhaltliche Kompetenz: Thema wurde verstanden und konnte gut wiedergegeben werden
I3 Wissenschaftliche Kompetenz: Formale Aspekte wurden verstanden und konnten gut wiedergegeben werden; die wissenschaftliche Methodologie wurde klar
I4 Einführung und Motivation: Die Einleitung führte adäquat in die Thematik ein und das Thema wurde gut motiviert
I5 Literatur: Vorherige Literatur wurde gut recherchiert und wiedergegeben; die Arbeit ordnet sich gut in die Hintergrundliteratur ein
F1 Allgemeine Struktur: Ausarbeitungsstruktur entspricht der Vorgabe; weitere Struktur ist plausibel und nachvollziehbar
F2 Beispiele: Ausreichend viele Beispiele verdeutlichen die formalen Inhalte
F3 Formale Korrektheit: Mathematische Aussagen wurden korrekt und vollständig dargestellt, Definition waren klar nachvollziehbar
F4 Bibliographie: Vorarbeiten sind entsprechend zitiert, das Literaturverzeichnis ist ordentlich
F5 Visualisierungen: Komplexere Sachverhalte wurden anschaulich visualisiert
D1 Sprache: Die Sprache ist wissenschaftlich, mathematische Ausdrücke sind wohlgeformt, der Drucksatz ist professionell
D2 Satz: Das Seitenlayout ist ansprechend und LaTeX-Umgebungen werden passend benutzt; der Drucksatz und ist professionell
D3 Rechtschreibung: Die Arbeit ist frei von Rechtschreib-, Grammatik- und Satzfehlern
D4 Layout und Seitenzahl: Das vorgegebene Layout wurde benutzt und die vorgeschriebene Seitenzahl eingehalten