

Guide to writing scientific papers

Term papers, theses (bachelor, master, diploma)

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1 Introduction

1.1 General Notes

In accordance with the study and examination regulations in force at Anhalt University of Applied Sciences, students of the Department of Electrical Engineering, Mechanical Engineering and Industrial Engineering are required to submit project reports, term papers, as well as Bachelor's, Diploma or Master's thesis.

These papers must basically meet scientific requirements. These requirements refer to the content, the type of literature used as well as to formal criteria. A scientific paper (hereinafter referred to as WA) that does not sufficiently take into account certain formal principles is not acceptable as a whole. Obviously, the advice documented in these guidelines cannot discuss all conceivable possibilities of citation methods, forms of arrangement, etc. If you are not sure how to proceed, ask your mentor. This applies especially to necessary deviations from the given design recommendations. This guide is based on the study and examination regulations, as well as the internship regulations in the currently valid version.

Before processing the topic and submitting the thesis, the corresponding applications for admission to the thesis (with topic and signature) must be submitted to the examination board/secretary's office. A confirmation of admission incl. deadline for submission will be sent by email.

By means of a submitted WA, students are to demonstrate that they are able to work on a problem independently within a given time, to apply scientific knowledge, to overview the technical contexts and to present the findings convincingly, unambiguously, in appropriate language and in a clear form, as well as to demonstrate scientific methods and social skills. An appropriate number of specialist literature and journals are to be evaluated.

1.2 Submission of the work

The WA is to be submitted in a form customary for scientific publications as an electronically readable document (e.g. PDF file) to the secretariat of the examination board in the department.

If the submission of bound copies has been agreed with the reviewers, a complete version of the paper must also be provided in electronically readable form. Additional file formats (Word or LaTeX file or similar) can be agreed with the supervisor. If scripts, animations, videos, internet sources, images and PDF files, source codes, measurement protocols or study results were relevant to the work, these must also be made available electronically at the request of the examiners or reviewers. Otherwise, a check of the correct use of sources cannot be guaranteed. For the submission of the term paper on the professional internship, it is sufficient to hand in an unbound copy (e.g. booklet/ring binder) or an electronic transmission to the mentor/examiner. You must coordinate the respective case with the mentor/examiner.

1.3 Evaluation of the work

Final theses are assessed and evaluated by at least two examiners independently of each other, whereby a practical opinion from the company supervisor, if available, can be taken into account. In any case, it is recommended to include a company statement (performance assessment on the implementation of the set task) with the thesis. Second examiners - also

external university examiners - can only be persons who are thematically and professionally competent and have at least an academic degree that the student wishes to acquire.

Examiners/reviewers consider the following criteria, among others, when evaluating theses:

- Independent professional treatment of the topic (taking into account the degree of difficulty)
- Treatment of the topic (e.g. problem definition, own initiative, systematics, creativity and own ideas)
- Use of technical or business expertise
- Use of methods, tools, instruments and models
- Economic evaluation and feasibility of the results (as far as relevant for the task)
- Extent, topicality and correct use of the literature used
- Consideration of formal requirements (structure, design, writing style, spelling and grammar, citation technique)

A final thesis must (as a rule) be defended in a public colloquium at the university (approx. 20 minutes own presentation of the thesis and its results and approx. 30 minutes discussion). In the colloquium for the final thesis, the students prove that they are able to present scientific findings and their own results using modern means of presentation and to represent them in a scientific discussion. The assessment criteria are the form and content of the presentation, as well as comprehensible presentation of (complex) facts, manner of presentation and proof of topic-related expertise in the discussion.

When preparing your work, please bear in mind that it can be checked automatically for plagiarism, even using plagiarism checking software. The word-for-word copying of other people's texts is therefore not permitted; if it is, this must be marked accordingly. For papers written in English, the US standard prescribed by the university applies.

1.4 Use of the professional title "Engineer"

According to the Engineering Act of the State of Saxony-Anhalt (IngG LSA) of January 22, 2009, graduates residing in Saxony-Anhalt (Bachelor's and Master's degrees) are entitled to apply to the Chamber of Engineers of the State of Saxony-Anhalt to use the professional title "Engineer".

2 Structure, layout and scope of the scientific work

2.1 Outline (recommendation)

A scientific paper usually consists of the following parts:

- Cover (only for printed copies)
- Title page (without page number)
- abstract (without page number)
- if applicable, blocking note (without page number)
- Foreword, if applicable
- Table of contents (including information on indexes, appendices and annexes)
- List of figures (optional in consultation with the mentor)
- List of tables
- List of abbreviations
- Text part of the paper (structured using decimal classification)
 - Introduction and problem definition
 - main part
 - Summary/Outlook
- Bibliography (reference books, journals, other written publications)
- List of sources (internet sources with hyperlink)
- Appendices (with preceding list of appendices)
- Declaration of independence (without page numbering)
- Appendix, if applicable (with list of appendices and own page numbering, e.g., loose in a slip pocket)

The outline should reflect the logical structure of the work. It must be systematic. As a rule, decimal classification is used (e.g., 1 Chapter One, 1.1 Section One, 1.2 Section Two, then possibly 1.2.1 Subsection One, 1.2.2 Subsection Two, etc.). More than four decimal places are to be avoided. Each subdivision must contain at least two sections or subsections! In the table of contents, each bullet point must be given a page number. The chapter and section designations in the table of contents must correspond exactly to the designations in the text of the paper.

In an outline, not only a mere list of pages should be recognizable, but above all the focus of the work as well as the logical argumentation structure. There are different possibilities of the outline available. In each case, the outline form should be chosen that provides the greatest overview depending on the number and content of your bullet points. Not only "optical" aspects play a role in an outline, but also the "red thread" of the argumentation must be recognizable.

Example of a graduated decimal classification of the text part of a WA

- 1 Heading Chapter 1
Blank line
Text
2 blank lines
- 2 Heading Chapter 2
<paragraph 6 pt>
- 2.1 Heading of section 1 to chapter 2
Blank line
Text

- Blank line
- 2.2 Heading of section 2 to chapter 2
<paragraph 6 pt>
- 2.2.1 Heading...
- ...

Note: There must be no period after the last digit of each bullet point.

2.2 Title page and page numbering

The title page of a thesis is to be designed according to the current version of the study and examination regulations or the internship regulations. For all WA, samples of the title pages to be used and the font recommended by the university ("Source Sans Pro"), or the font agreed upon with the mentor, are to be used. All templates are available on the Board of Examiners website.

With the exception of the title page, the blocking note, the brief summary, and the statement of independence, all pages must be numbered with a page number. The text portion of the paper shall be numbered consecutively using Arabic numerals (beginning with the number 1). All other parts of the paper are numbered consecutively with Roman numerals. The page number should be placed at the top or bottom right margin in the header or footer, respectively. All pages are to be written on one side.

2.3 Layout

(underlined points are requirements, otherwise recommendation)

<u>Paper/format:</u>	DIN A4, white, written on one side only
Margins:	left 2.5 cm, right 2.5 cm, top 2.5 cm, bottom 2 cm
<u>Line spacing:</u>	1 ½ -line or 15 pt
<u>Font type, size:</u>	recommended font (e.g. "Source Sans Pro"), 11 pt
Headings:	bold, not underlined, or 12 pt
Paragraph:	paragraph separation with a blank line, no indentation, justification
Page numbering:	in the text part consistently at the top or bottom right in the header or footer

Exceptions for font size and line spacing are only permitted for longer direct quotations, which should absolutely be in the text and not in the appendix for the course of the argument.

Formulas are to be started indented and included in the punctuation. Leave one line free before and after formulas!

2.4 Declaration of independence, blocking note, short summary (abstract)

A declaration of **self-sufficiency** with the following or an analogous wording must be submitted with each WA.

I/we hereby declare that the work has been written independently, that it has not yet been submitted in the same or a similar version in another degree program as an examination performance, and that no aids and sources other than those indicated, including the software indicated or described, have been used.

Place, date, signature

This declaration must be signed by all authors involved.

If confidential company matters are addressed in the work, the work or parts thereof can be marked by the company with a **blocking note** (usually immediately following the title page of the WA) on a header sheet, which is to be formulated as follows.

The content of the work may not be made available to third parties without the permission of the (name of company). This blocking notice is valid for a period of X years.

*Date, stamp and signature (of the company/supervisor issuing the blocking notice) →
a student cannot issue a blocking notice for his/her work!*

The display of a blocking notice means that the thesis or the contents of the thesis are only available to the two reviewers for evaluation. After the colloquium on the final paper or term paper, it may not be further used or published - even upon request.

Notes:

- Outstanding scientific theses with a blocking notice can therefore also not be submitted for an award (e.g. VDE or IMT prize).
- Blocking notices can only be issued by the companies involved in the work (stamp and signature of those authorized to do so). Students cannot issue a blocking notice to their work themselves.

The WA must be preceded by a short **summary/abstract** of no more than one page. It is to be structured as follows:

- Information about the author(s)
- Title of the work
- Type of thesis (Bachelor / Master/...)
- Short summary / description of the work
- Year

2.5 Scope of work

The following page numbers for the **text part** of the paper should not be exceeded. Listings, source codes, layouts, circuit diagrams, cable diagrams, multi-page tables, business process models, etc. should be presented as an attachment or in the appendix of the paper. Exceptions are to be agreed upon with the respective mentor.

Term paper on the professional internship: approx. 20 - 25 pages

Bachelor thesis: approx. 40 pages

Master and diploma thesis: approx. 60 - 80 pages

If complex issues require an extended scope, this should be agreed upon and coordinated with the reviewers prior to submission of the paper.

Introduction

- Introduction (max. 3 pages)

Introduction to the field, focus of the work

Mention of the company and the field of activity (if the WA is carried out in a company).

- Detailed analysis and explanation of the task

What was already available at the beginning of the work, which boundary conditions are given?

What means and techniques are available?

What is the main focus of the work?

Which solution variants are possible or given?

In which work steps should the task be processed?

Main part

- Level of knowledge in the field to be worked on

After conducting a literature search, essential standards and emerging trends are to be discussed in a short and concise form (references to the evaluated sources, where can the reader obtain further information?).

In this section, the author should demonstrate that he or she is familiar with the major development trends in the relevant field. The reader should receive a concise introduction to the subject area.

- Development of the solution concept (own share must be recognizable)

Discussion of alternative approaches to the solution, justification of the choice of solution. What are the individual stages of the topic processing, justification of the selected work steps. Which means and techniques (e.g. tools for software) should be used for processing? As a basic rule: Simple facts are to be presented simply, difficult facts are to be described simply.

- Presentation of the results achieved in the course of working on the topic

Explanation of the elaborated results, generalization and derivation of conclusions.

Discussion of the results with regard to the requirements set out in the assignment.

Use of graphics and clear examples, reference to further information in the appendices (e.g. excerpts from the source code of software developed during the period under review or references to the appendix).

Close (Conclusion/Outlook)

- Summary (max. 3 pages)

Summary of the main results. Evaluation of the solutions implemented so far, status of testing. Starting points for further work.

3 Spelling and grammar

The official guidelines of the new German spelling are to be bindingly applied in the preparation of the work. Poor style, orthographic and grammatical errors will affect the grade of the paper. The list of abbreviations must not include abbreviations that are already listed in the Duden. The list of abbreviations is to be aligned using tabs and arranged alphabetically.

4 Citation technique and bibliography

- Citation technique

Various forms (EIT, MB, MT, WIW, etc.) are acceptable for citing literature sources (coordinate this with your mentor before writing the paper):

1. References are marked in the form "[X]" immediately following the text or facts in the paper. The bibliography is part of the sentence and is not separated.

Example: The standardization of the described technology already took place in 2020 [1].

In the bibliography, the literature source is then to be indicated as follows:

[1] Bartneck, N.; Klaas, V.; Schönherr, H. [eds]: Optimizing processes with RFID and Auto-ID: fundamentals, problem solving and application examples. 1st ed., Publicis Corporate Publishing, 2019, p. 59 ff.

2. Footnotes, which normally serve to further explain the continuous text, can also be used for source citations. All source citations are given on the page where they are first used.

Example: Standardization of the described technology already took place in 2021.⁵

The literature source must then be indicated in the footer as follows:

⁵ Bartneck, N.; Klaas, V.; Schönherr, H. [Hrsg.]: Prozesse optimieren mit RFID und Auto-ID: Grundlagen, Problemlösung und Anwendungsbeispiele. 1. Aufl., Publicis Corporate Publishing, 2019, S. 59 ff.

For any further use of this source, it is then sufficient to indicate the author, an abbreviated form of the title, the reference "a.a.O." and, if applicable, the page number.

¹² Bartneck, N.: Prozesse optimieren mit RFID, a.a.O., S. 63 ff.

3. References in economics (WIW) are usually given according to the Harvard citation style immediately following the text or facts in the paper in the form "(author year, page number)".

Example: Demanders are customers of a company if you buy or have bought services of the company (Homburg 2020, p. 3).

In the bibliography, the literature source (when sorted alphabetically by last name) should then be indicated as follows: Homburg, C. (2020): Marketingmanagement: Strategie - Instrumente - Umsetzung - Unternehmensführung, 7th ed.

- Figures and tables

All figures and tables used in the text must be listed and numbered in the appropriate separate indexes. If possible, use a vector graphic format for figures to ensure high quality.

If you have adopted figures or tables one-to-one, either a footnote to this effect or a precise caption must be inserted below the figure/table. When copying figures / tables, the source must be indicated in each case. In the case of figures/tables that you have modified according to an external template, the caption must always contain the words „cf.“. Figures can be left-aligned, right-aligned or embedded in the text.

FIGURES

Fig. 99: titel

(Source: (**cf.**) [X] Krüger, W.; Pfeiffer, P.: Strategische Ausrichtung, 1988, p. 9.) [X] stands for a digit in the bibliography and list of sources.

Figures and tables must not be used separately as gap fillers. In any case, a reference to them must be recognizable in the text.

- Bibliography and sources

All sources mentioned must be included in the bibliography or list of sources either in the order of their numbering or in alphabetical order in complete form.

Example:

[X] Bartneck, N.; Klaas, V.; Schönherr, H. [Eds:] Optimizing processes with RFID and Auto-ID: fundamentals, problem solving and application examples. 1st ed., Publicis Corporate Publishing, 2019, p. 59 ff.

If you cite several works by one author, put the most recent publication first.

If you cite an author who is not at the same time the sole editor of the book - for example, in the case of anthologies or conference proceedings - you must include the overall editor as well as the author of the cited individual contribution in the bibliography. For the individual contribution, the page number must be given.

Example:

[X] Strommer, W.: Dienstleisterauswahl und Projektmanagement: Strategien für den Mittelstand. In: Haasis, K., Zerfaß, A. [Hrsg.]: Digitale Wertschöpfung. dpunkt-Verlag, 1999, S. 37

When citing journal articles, be sure to give the exact issue and page number!

Examples:

[X] Ehrenberg, D., Winand, U.: Virtuelle Aus- und Weiterbildung. In: Wirtschaftsinformatik 43 (2001) 1, S. 3 - 4.

If the literature has more than three editors, the authors are listed in this form:

[X] Alewell, K. et al.

If there are several places of publication, e.g. Berlin, New York, Heidelberg..., it is sufficient to specify Berlin and others.

Internet sources

When quoting Internet sources, these must also be clearly identified. The complete link and the date of access must be documented.

For the following three cases, you should use the specified citation method.

Example 1: An author is indicated in the Internet source.

[X] Sauerbrey, R.: Bachelor in Deutschland?
http://www.zeit.de/2021/07/Bachelor_in_Deutschland_ (20.07.2021, 12:30 Uhr)

Example 2: Only the domain name is known from the Internet source.

[X] SAP AG: Small and medium enterprises
<http://www.sap.com/germany/sme/index.epx> (20.07.2021, 12:37 Uhr)

Example 3: The cited source could be downloaded as a separate file (PDF, DOC, PPT and the like).

[X] SAP AG [Hrsg.]: mySAP.com Workplace (Fact Sheet);
<http://www.sap.com/germany/index.epx> (20.07.2010, 12:40), saved as: mysap.pdf

For other possible cases, use the citation technique mutatis mutandis.

Whatever form of citation and presentation you choose, make sure you use one form throughout!

It is recommended to use the Citavi® software for all literature and internet sources when preparing the thesis. The university library can provide further advice on this. You can find relevant information on the university's websites.

5 Sources of information

As a matter of principle, use only scientific literature. Quotations from the "tabloid press" or trivial literature are not suitable to substantiate or corroborate scientific thoughts, but can be used if evaluated accordingly. Likewise, Wikipedia, encyclopedias, course scripts, and the like should not be used as primary literature.

If possible, choose only the most recent edition of a book or the source of the first publication of the statement Exception: you want to give a historical reference.

6 Further reading

- Karmasin, M., Ribing, R.: Die Gestaltung wissenschaftlicher Arbeiten. UTB, 2006
- DIN 5008, Schreib- und Gestaltungsregeln für die Textverarbeitung. Beuth, 2001
- Präsentationstechnik für Dissertationen und wissenschaftliche Arbeiten. Beuth Verlag, 2000
- Grieb, W.: Schreibtipps für Diplomanden und Doktoranden. VDE Verlag, 1999
- Werder, L.: Kreatives Schreiben von Diplom- und Doktorarbeiten. Schibri-Verlag, 1998
- Word 2007, Wissenschaftliche Arbeiten, Handbuch des RRZN Hannover, Juni 2009
- Word2010, Wissenschaftliche Arbeiten und große Dokumente, Handbuch des RRZN Hannover, Juni 2011
- Hering, H., Hering, L.: Technische Berichte. Verständlich gliedern, gut gestalten, überzeugend vortragen. Springer Vieweg, Wiesbaden, 2015