# The hagenberg-thesis Package

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**Abstract**

The hagenberg-thesis package is a collection of modern LaTeX templates for university theses (bachelor, master or diploma programs) and related documents. This manual describes the main features of this package. Pre-configured document templates for English and German manuscripts and a complete tutorial are available on the package's home repository.

## 1 Introduction

The complete source of this package and auxiliary materials are available on CTAN[1] and its development repository.[2] The package is made available under the terms of the Creative Commons Attribution 4.0 International Public License.[3]

## 2 Document classes

The `hgb` package provides the following document classes, which are based on the standard LaTeX classes `book`, `report` and `article`, respectively:

- **`hgbthesis`** (`book`): for bachelor's, master's and diploma theses;
- **`hgbreport`** (`report`): for project and term reports;
- **`hgbarticle`** (`article`): for drafting journal articles.

### 2.1 Class options

All document classes accept the following **general options**:

- `english` or `german` (select the primary language),
- `smartquotes` (use smart quotes replacement),

[1] https://ctan.org/pkg/hagenberg-thesis
[2] https://github.com/Digital-Media/HagenbergThesis
[3] https://creativecommons.org/licenses/by/4.0/legalcode

- `apa` (use `apa` bibliography style instead of `numeric-comp`),
- `noUpdateCheck` (suppress check of package release date).

In addition, the following **class-specific options** are accepted:

- **`hgbthesis`**: `master`, `diploma`, `bachelor`, `internship`;
- **`hgbreport`**: `notitlepage`;
- **`hgbarticle`**: `twocolumn`.

For example, to start a master's thesis in German one would simply simply place

```
\documentclass[master,german,smartquotes]{hgbthesis}
```

at the beginning of the document.

### 2.2 Thesis parameters (class `hgbthesis`)

`hgbthesis` supports several types of thesis documents. The following parameters must be specified for *all* types:

- `\title{...}`,
- `\author{...}`,
- `\programtype{...}`,
- `\programname{...}`,
- `\placeofstudy{...}`,
- `\dateofsubmission{yyyy}{mm}{dd}`,
- `\advisor{...}` (optional).

Note that `hgbthesis` only supports a *single author* inside the `\author{...}` macro argument (commands `\and` and `\thanks{...}` are deactivated)!

## 3 Style files and user commands

The package comes with a set of style (`*.sty`) files that can be used independently of the document classes listed above: `hgb.sty`, `hgbabbrev.sty`, `hgbbib.sty`, `hgbheadings.sty`, `hgblistings.sty`, `hgbmath.sty`.

### 3.1 General user commands and environments(`hgb.sty`)

- **`\hgbDate`**: Outputs the package version date, e.g., "`2021/06/15`".
- `\calibrationbox{width}{height}`: Inserts a test box for checking the final print size (in millimeters).
- `\begin{english} ... \end{english}`
- `\begin{german} ... \end{german}`

### 3.2 Text commands (`hgbabbrev.sty`)

Special characters:

- **`\bs`**: Inserts a backslash character (short for `\textbackslash`).
- **`\obnh`**: Inserts an optional break with no hyphen (e.g., `PlugIn{\obnh}Filter`).

German abbreviations:

- **\bzgl**: bzgl.
- **\bzw**: bzw.
- **\ca**: ca.
- **\dah**: d. h.
- **\Dah**: D. h.
- **\ds**: d. sind
- **\etc**: etc.
- **\evtl**: evtl.
- **\ia**: i. Allg.
- **\sa**: s. auch
- **\so**: s. oben
- **\su**: s. unten
- **\ua**: u. a.
- **\Ua**: U. a.
- **\uae**: u. Ä.
- **\usw**: usw.
- **\uva**: u. v. a.
- **\uvm**: u. v. m.
- **\va**: vor allem
- **\vgl**: vgl.
- **\zB**: z. B.
- **\ZB**: Zum Beispiel

English abbreviations:

- **\ie**: i.e.
- **\eg**: e.g.
- **\etc**: etc.
- **\Eg**: E.g.
- **\wrt**: w.r.t.

Note that none of the above abbreviation macros "eats" subsequent white space, i.e., they can be used without additional controls, as in "`\wrt what I said`", for example.

## 3.3 Bibliography commands (`hgbbib.sty`)

- **\AddBibFile**: A wrapper to `biblatex`'s `\addbibresource` macro (for backward compatibility only).
- **\MakeBibliography[*options*]**: Inserts the reference section or chapter. By default, references are automatically split into category subsections.[4] Use the option `nosplit` to produce a traditional (i.e., contiguous) list of references.

[4] Predefined reference categories are `literature`, `avmedia`, `online` and `software`.

- **\citenobr{*keys*}**: Analogous to the standard \cite{*keys*} command, but inserts no "backref" page numbers in the bibliography.
- **\mcite[*text1*]{*key1*}[*text2*]{*key2*}...[*textN*]{*keyN*}**: Analogous to biblatex's \cites command,[5] but inserts semicolons between reference entries for better readability.

## 3.4 Code environments (hgblistings.sty)

The following types of code environments are defined:

- **CCode**: for C (ANSI),
- **CppCode**: for C++ (ISO),
- **CsCode**: for C#,
- **CssCode**: for CSS,
- **GenericCode**: for generic code,
- **HtmlCode**: for HTML,
- **JavaCode**: for Java,
- **JsCode**: for JavaScript,
- **LaTeXCode**: for LaTeX,
- **ObjCCode**: for ObjectiveC,
- **PhpCode**: for PHP,
- **PythonCode**: for Python,
- **Swift**: for Swift,
- **XmlCode**: for XML.

**hgblistings** is based on the **listingsutf8**[6] package, thus any valid **listings**[7] option may be used; for example, the option **numbers=none** to suppress line numbers:

```
\begin{JavaCode}[numbers=none]
... // Java code comes here
\end{JavaCode}
```

## 3.5 Mathematical commands (hgbmath.sty)

**hgbmath** requires (and automatically loads) the **amsmath**[8] package, thus all commands and symbols of **amsmath** are available by default. The following *additional* commands can only be used in math mode:

- **\Cpx**: $\mathbb{C}$ (complex numbers),
- **\N**: $\mathbb{N}$ (natural numbers),
- **\R**: $\mathbb{R}$ (real numbers),
- **\Q**: $\mathbb{Q}$ (rational numbers),
- **\Z**: $\mathbb{Z}$ (integer numbers).

[5] http://mirrors.ctan.org/macros/latex/contrib/biblatex/doc/biblatex.pdf (see Sec. 3.8.3)
[6] https://ctan.org/pkg/listingsutf8
[7] https://ctan.org/pkg/listings
[8] https://ctan.org/pkg/amsmath

## 3.6 Algorithms (hgbalgo.sty)

hgbalgo is a stand-alone package that is based on – and extends – the algorithmicx and algpseudocodex packages.[9] It fixes some (mostly indentation-related) problems, adds color and provides some additional commands. It also loads the algorithm[10] package which defines a compatible float container for algorithms: \begin{algorithm} ... \end{algorithm}.

Additional user commands:

- **\StateNN[<nesting>]{<text>}**: Creates a *non-numbered* statement like algorithmicx's \Statex command but provides controlled indentation inside nested constructs. The optional integer argument <nesting> can be used to specify the *nesting depth* to compensate for a bug in algorithmicx (the nesting level inside a block is not set properly before the first \State command). Omitting the optional argument should give correct indentation in most cases.
- **\Input{<text>}**: For describing the input parameters in a procedure's preamble.
- **\Output{<text>}**: For describing the output values in a procedure's preamble.
- **\Returns{<text>}**: For describing the return values in a procedure's preamble.

Vertical spacing commands: The following commands are provided for fine-tuning the vertical spacing between individual statements of an algorithm (the standard spacing commands like \smallskip etc. have no effect between statements):[11]

- \algsmallskip: inserts 3pt extra space,
- \algmedskip: inserts 6pt extra space,
- \algbigskip: inserts 12pt extra space.

They are supposed to be used inside (i.e., at the end of) statements, for example:

```
\State $x \gets x + 1$ \algsmallskip
```

Defined algorithm colors:

- **AlgKeywordColor** (for algorithm keywords),
- **AlgProcedureColor** (for procedure and function names).

These colors can be redefined at any time (see the xcolor[12] package), e.g., by

```
\definecolor{AlgKeywordColor}{named}{black}
\definecolor{AlgProcedureColor}{rgb}{0.0, 0.5, 0.0}      % dark green
```

[9] https://ctan.org/pkg/algorithmicx, https://ctan.org/pkg/algpseudocodex
[10] https://ctan.org/pkg/algorithms
[11] Note that the standard spacing commands work *between* procedure and function blocks in the usual way.
[12] https://ctan.org/pkg/xcolor

### 3.7 Abbreviations, Acronyms and Nomenclature (hgbacro.sty)

hgbacro is a wrapper for the acro[13] package. It provides a simple and pre-configured setup to typeset acronyms or nomenclature.

Acronyms should be defined in a file called acronyms.tex in the root directory. By using the \ac{...} command, acronyms can be referred in the running text. The extended description is used for the first appearance, whereas the acronym is printed for any subsequent use.

To display a list of acronyms, use the \PrintAcronyms command.

For additional options, please refer to the acro manual.

## 4 Package dependencies

The hagenberg-thesis package builds on the following LaTeX packages:
abstract, acro, algorithm, algorithmicx, algpseudocodex, amsbsy, amsfonts, amsmath, amssymb, babel, biblatex, breakurl, caption, cmap, csquotes, datetime2, enumitem, epstopdf, eurosym, exscale, fancyhdr, float, fontenc, geometry, graphicx, hypcap, hyperref, ifpdf, inputenc, listingsutf8, lmodern, moreverb, overpic, pdfpages, pict2e, subdepth, titlesec, titling, tocbasic, url, upquote, verbatim, xcolor, xifthen, xstring, xspace.

[13] https://ctan.org/pkg/acro