

# 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<sup>1</sup> and its development repository.<sup>2</sup> The package is made available under the terms of the Creative Commons Attribution 4.0 International Public License.<sup>3</sup>

## 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

#### 2.1.1 General options

All document classes accept the following general options:

- `english` or `german` (select the primary language),
- `smartquotes` (use smart quotes replacement),
- `apa` (use `apa` bibliography style instead of `numeric-comp`),
- `noUpdateCheck` (suppress check of package release date).

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<sup>1</sup><https://ctan.org/pkg/hagenberg-thesis>

<sup>2</sup><https://github.com/Digital-Media/HagenbergThesis>

<sup>3</sup><https://creativecommons.org/licenses/by/4.0/legalcode>

### 2.1.2 Class-specific options

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

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

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

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

at the beginning of the document.

The `proposal` option is intended for a *thesis proposal* (“Exposé”) and is only effective in *conjunction* with the `bachelor` and `master` options, e.g.,

```
\documentclass[bachelor,proposal,german,smartquotes]{hgbthesis}
```

To migrate a proposal document to the final thesis, only the `proposal` needs to be removed.

## 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., “2023/01/14”.
- `\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.<sup>4</sup> Use the option `nosplit` to produce a traditional (i.e., contiguous) list of references.
- `\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,<sup>5</sup> 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<sup>6</sup> package, thus any valid listings<sup>7</sup> option may be used; for example, the option `numbers=none` to suppress line numbers:

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

<sup>4</sup>Predefined reference categories are `literature`, `avmedia`, `online` and `software`.

<sup>5</sup><http://mirrors.ctan.org/macros/latex/contrib/biblatex/doc/biblatex.pdf> (see Sec. 3.8.3)

<sup>6</sup><https://ctan.org/pkg/listingsutf8>

<sup>7</sup><https://ctan.org/pkg/listings>

### 3.5 Mathematical commands (`hgmath.sty`)

`hgmath` requires (and automatically loads) the `amsmath`<sup>8</sup> 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).

### 3.6 Algorithms (`hgbalgo.sty`)

`hgbalgo` is a stand-alone package that is based on – and extends – the `algorithmicx` and `algpseudocodex` packages.<sup>9</sup> It fixes some (mostly indentation-related) problems, adds color and provides some additional commands. It also loads the `algorithm`<sup>10</sup> 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 situations.
- `\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):<sup>11</sup>

- `\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
```

<sup>8</sup><https://ctan.org/pkg/amsmath>

<sup>9</sup><https://ctan.org/pkg/algorithmicx>, <https://ctan.org/pkg/algpseudocodex>

<sup>10</sup><https://ctan.org/pkg/algorithm>

<sup>11</sup>Note that the standard spacing commands work *between procedure and function blocks* in the usual way.

Defined algorithm colors:

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

These colors can be redefined at any time (see the `xcolor`<sup>12</sup> package), e.g., by

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

## 4 Package dependencies

The `hagenberg-thesis` package builds on the following LaTeX packages:

`abstract`, `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`.

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<sup>12</sup><https://ctan.org/pkg/xcolor>