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

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).

[1] https://ctan.org/pkg/hagenberg-thesis
[2] https://github.com/Digital-Media/HagenbergThesis
[3] 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, 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}
```

This option is meant for a short exposé, containing only one chapter. Thus, chapter numbers are not displayed. Remove the `proposal` option to migrate a proposal document to the final thesis (and restore the usual numbering scheme).

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., "`2023/02/13`".
- `\getcurrentlabel`: Yields the most recently assigned label number.
- `\calibrationbox{width}{height}`: Inserts a test box for checking the final print size (in millimeters).

- `\begin{block}...\end{block}`: Dummy environment, provides a limited scope for variable/command redefinitions.
- `\begin{english}...\end{english}`: Temporarily switches to English language settings.
- `\begin{german}...\end{german}`: Temporarily switches to German language settings.

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.
- `\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}
```

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

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).

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 algorithm 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):[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
```

[8] https://ctan.org/pkg/amsmath

[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.

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
```

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, lengthconvert, listingsutf8, lmodern, moreverb, overpic, pdfpages, pict2e, subdepth, titlesec, titling, tocbasic, url, upquote, verbatim, xcolor, xifthen, xstring, xspace.

[12] https://ctan.org/pkg/xcolor